Common Beetles of the British Uplands

W. E. Sharp. F.E.S.

PLATE B.

BEETLES OF THE UPLANDS.

From left to right.

First row.

1. CARABUS GLABRATUS.
2. CYCHRUS ROSTRATUS.
3. CARABUS CATENULATUS.

Second row.

4. CARABUS ARVENSIS.
5. CRYPTOCEPHALUS AUREOLUS.
6. CHRYSOMELA CEREALIS.
7. NECROPHORUS MORTUORUM.

Third row.

8. GEOTRUPES VERNALIS.
9. OADEMERA NOBILIS.
10. NECROPHORUS HUMATOR.

All natural size.

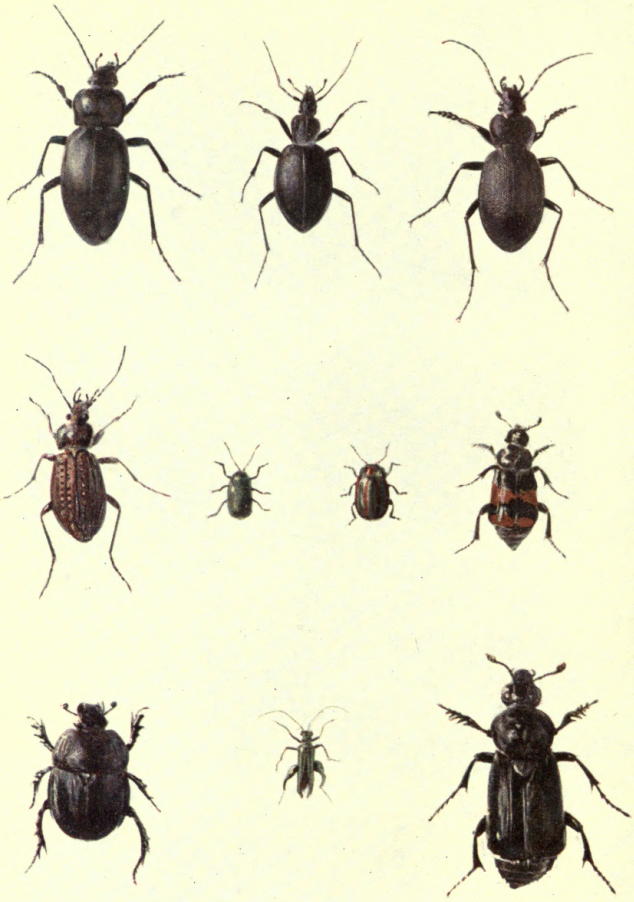

PLATE B. [*See over.*

COMMON BEETLES OF THE BRITISH UPLANDS

BY
W. E. SHARP, F.E.S.

With Coloured and other Illustrations

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INTRODUCTION

EVERYBODY who is sufficiently conversant with the open book of Nature to recognize a beetle when he or she sees one, is aware how large a part they play in the great drama of the Insect world, how numerous and diverse they are as species, how abundant as individuals. Unlike some of our other insects, beetles occur everywhere, and at all times of the year. From the summit of Ben Nevis to far below high water mark on the shore—forest and fen—the wild bogs of Connacht to the well-tilled lowlands of East Anglia—the moors and mountains of Ultima Thule, and the pathless chalk downs of Wessex—Highland loch, and Lowland mere—pond and wayside ditch—the great persistent river and the most evanescent mountain rill—town and country, the nests of ants and birds and mammals; and the dwelling places of mankind—all these have their beetles; some few common to the land or water of them all, some special to each. And as I have dealt in other parts of this little series with certain of the beetles to be found under some of these varying environments, so in the present part I invite the attention of the reader, whom I assume to be a lover, if not a student, of Nature in her more detailed manifestations, to some of the members of the order whose hiding places are among the everlasting hills, or at least who haunt that great sweep of uplands which we call the North and South Downs.

Introduction

Beetles, as everyone knows, are Insects, and under the name of *Coleoptera* (signifying sheath-winged), they form one, and that one of the largest, of the great orders into which the class *Insecta* is divided, this class being a section of the sub-kingdom *Arthropoda*, which comprises probably by far the greater number of distinct species into which animal life on this planet has been differentiated.

Beetles, like all other objects in nature, have their affinities, and have been divided by naturalists according to those affinities into sections which correspond more or less with what we must believe to have been the course of their evolution in time. Now, it is not my desire, nor would it be consonant with the purpose of this little book, to weary the reader with the complicated tables necessary to explain all these divisions;* but I think I may at least state that there are some eight major groups into which the order may in the first case be divided,and that these divisions depend principally on various structural differences of legs and antennæ, as well as of habit. The first of these groups, the *Adephaga*, contains both land and water beetles; they all have long thin antennæ of uniform thickness throughout, five joints to each tarsus (the tarsus being the last of the three sections of the leg, and analogous to our foot), they are rapid in movement and predaceous in habit. Some are represented on plate B., Fig. 1, 2, and 3.

The second group, the *Clavicornia*, is very large and contains beetles of very different size, structure, and habit. They may all be known however by

*For further information on this and other points, see "The Coleoptera of the British Islands," by the Rev. Canon Fowler, M.A., F.E.S., etc. (L. Reeve & Co.), 1887.

their antennæ terminating in a club or knob. In the sub-group *Brachelytra* (or "rove beetles"), distinguished by their long and flexible hind body projecting far beyond the elytra (wing cases) (see Plate V., Fig. 4 and 18); the antennæ are merely more or less thickened at the extremity. Another sub-group—the *Palpicornia* form the aquatic section of the *Clavicornia.*

The members of the third group, called the *Lamellicornia,* are fairly large and very convex, their antennæ are short, and the terminal joints so articulated at the base that they can be folded one on another like the leaves of a fan, their legs are short and stiff and the front pair often thickened and toothed for digging. Fig. 8, on Plate B. represents one of them.

The *Serricornia,* the fourth group, is another very heterogeneous collection of beetles; it is divided into three sub-groups;—the *Sternoxi,* hard and elongate, generally with the power of leaping (the popularly known "Skip-jack" beetles); the *Malacodermata,* elongate with soft leather-like elytra and long antennæ; and the *Teredilia*—generally smaller, sometimes almost spherical, with short antennæ. The one character which unites the whole group is the structure of the antennæ which are more or less serrate, that is, that the joints are united along a lateral instead of a central axis, and thus appear toothed like a saw or even branched. Some of these are shown on Plate V., Fig. 6, and Plate VI., Fig 19.

The *Longicornia* form the fifth group—large handsome beetles, elongate in shape with long legs and usually very long antennæ, whose larval life is spent in the interior of timber.

The sixth group, the *Phytophaga,* feed exclusively

on plants. They are nearly all small beetles, usually convex, and sometimes almost spherical; many have, by means of the strongly developed muscles of the femora (thighs) of their hind legs, the power of leaping long distances, and among these are many beetles such as the " turnip flea," highly injurious to growing crops. Their antennæ are moniliform, that is, like a series of minute beads strung on a string. One is represented on Plate B., Fig. 6.

The seventh group called *Heteromera* is another collection of species differing much morphologically. One character unites the group, that is, that while the front and middle tarsi have five joints each, the hinder tarsi have only four. One of them is represented on Plate B., Fig. 9.

The eighth and last group, *Rhynchophora*, or " weevils," may easily be known by the prolongation of the front of the head into a longer or shorter beak or snout, their antennæ are angled or elbowed, and clubbed, with the first joint very long, they are slow in movement, and all their tarsi apparently four-jointed. The whole group are either plant or wood feeders. Examples are shown on Plate V., Figs. 12 and 17.

Since the metric system is now almost universally used in Biology for the expression of measurement, I have ventured to adopt that system in the descriptions which follow. MM. will therefore denote one millimetre, which = ·03937 inch.

PLATE IV

BEETLES OF THE DOWNS.

First Row. *From left to right.*

1 Xylocleptes bispinus.
2 Stenus erichsoni.
3 Pselaphus heisei.
4 Blechrus maurus
5 Meligethes murinus.
6 Anisotoma badia.

Second Row.

7 Longitarsus exoletus.
8 Astilbus canaliculatus.
9 Demetrias atricapillus.
10 Tachyporus chrysomelinus.
11 Orchestes fagi.

Third Row.

12 Lebia chlorocephala.
13 Oedemera lurida.
14 Cionus hortulanus

Fourth Row.

15 Badister unipustulatus.
16 Chrysomela hyperici.
17 Cryptocephalus hypochæridis.

Fifth Row.

18 Brachinus crepitans.
19 Calathus flavipes.
20 Ophonus brevicollis.

(*All twice natural size*).

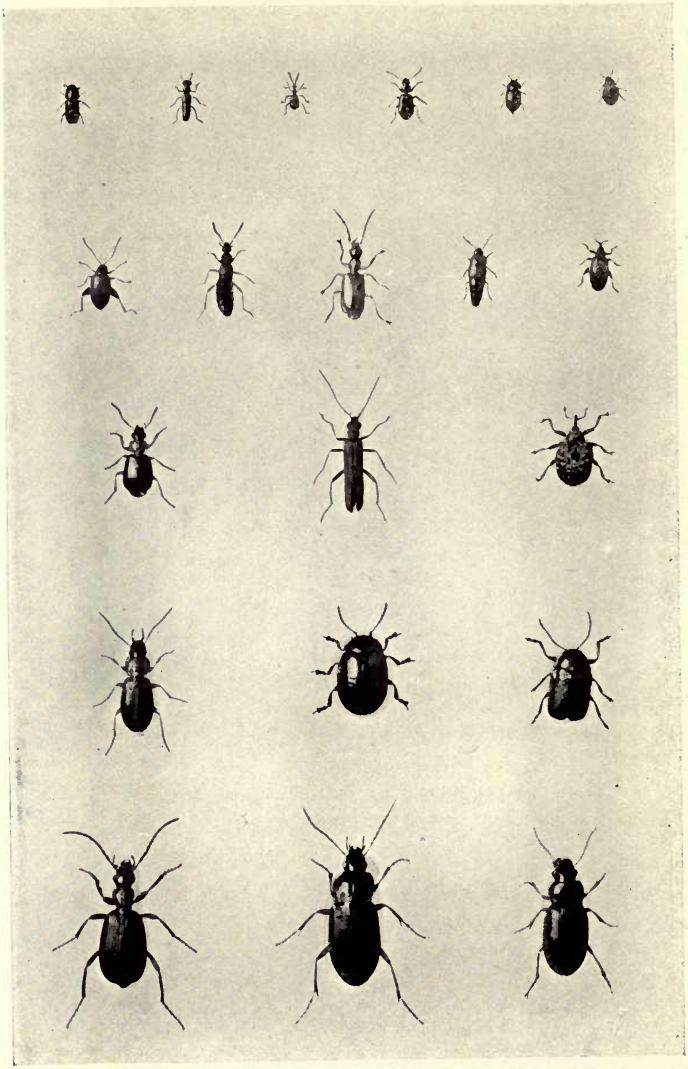

PLATE IV.

[See over.

CHAPTER I.

The Beetles of the Downs

CORRIGENDA IN PLATES.

PLATE A.	Row 2.	No. 5.	For MELOLOUTHA, read	MELOLONTHA
	Row 3.	No. 9.	„ TENELRICOSA,	„	TENEBRICOSA
PLATE B.	Row 3.	No. 9.	„ OADEMERA,	„	ŒDEMERA
PLATE D.	Row 3.	No. 9.	„ TENELRIO,	„	TENEBRIO

band of oolite which cuts transversely right through the country. Not that the Downs rise to any great altitudes, but they have a character that is their own in a sense that the Cotswolds and the Chilterns and all the little elevations of the Midlands do not possess. What strikes one most about the Chalk Downs of Southern England is their immense spaciousness, the long, long lines of their horizons, the interminable emptiness of their placid slopes. In Cumberland and Carnarvonshire one is conscious of fierce subterranean forces,—masses of volcanic rock, abrupt, savage, overwhelming, thrown high up to Heaven,

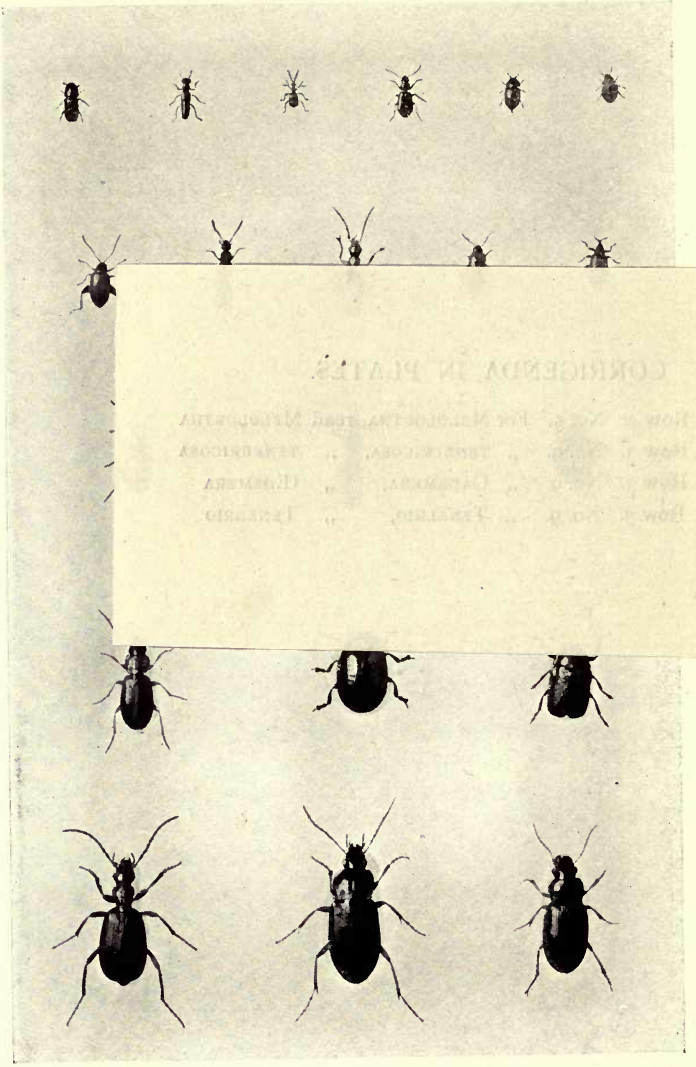

PLATE IV.

[See over.

CHAPTER I.

The Beetles of the Downs

If we draw a line across England from Gloucester to Hull—south of that line will be found no elevation which in our boldest flight of imagination can be called a mountain. Yet the south-eastern portion of our island is not without its eminences, and I think the most characteristic of these are certainly the Downs—North and South—where they enclose the Weald, broadening into one great central mass as they unite and sweep westward through Dorset and Wiltshire till they thin out and disappear against that band of oolite which cuts transversely right through the country. Not that the Downs rise to any great altitudes, but they have a character that is their own in a sense that the Cotswolds and the Chilterns and all the little elevations of the Midlands do not possess. What strikes one most about the Chalk Downs of Southern England is their immense spaciousness, the long, long lines of their horizons, the interminable emptiness of their placid slopes. In Cumberland and Carnarvonshire one is conscious of fierce subterranean forces,—masses of volcanic rock, abrupt, savage, overwhelming, thrown high up to Heaven,

and then carved and grooved and hollowed into mere and llyn, grim precipice and desolate valley, by the heavy hand of the ice of succeeding years. In Sussex and in Wiltshire one is more aware of the slow, quiet, ceaseless denudation of the centuries, exerted through millions of years as it is to-day, that has planed down their long convexities and moulded their gently undulating contours. Moreover, their substance, the material out of which they are carved, is everywhere the same—Box Hill and Ditchling Beacon, Dover Cliff and the foundations of Stonehenge, all the same white chalk with its layers of flints washed out and strewn all over the short turf of their slopes.

And if the Downs have thus a character of their own as elements in the aspect of our Southern England, so also they maintain a flora and, partly dependent on that, a fauna equally characteristic. A volume might be written on the peculiar plants and birds and insects of those long grey sweeps of chalk. Our immediate purpose is to discover something about their beetles. We can attack them anywhere with much the same results, and probably any expedition for such a purpose will involve a short railway journey as a preliminary. Let us assume, then, that we have alighted at such a station as Dorking, or Buckland Hill, in Surrey, or somewhere north of Brighton, or in the vicinity of Salisbury, and found ourselves on one of those white dusty roads that thread the valleys of the chalk country. Our apparatus on such an occasion need only include the sweep net, a few

sheets of strong brown paper on which to tear moss in pieces, and the usual laurel bottle or tubes. If the country is not quite familiar to us, an inch ordnance survey map of the particular locality we are exploring will prove useful. By its means, if not otherwise, we may discover where some narrow lane gives upon the high road which will bring us up beyond the tilled fields to the bare slopes above, such a one as Richard Jefferies, with that wonderful sense of his of the "values" of accurate detail, has described for us as "Clematis Lane"; such a one as, in fact, actually exists running off the main road to the North of Box Hill, and under the name of Headley Lane has become classic ground for the coleopterist. But there are plenty of such lanes—what serves for the hedge a tangle of clematis, perhaps we are led through a little copse of beeches in the lower part, higher up yews bent to the prevailing winds will probably line the track.

We might begin operations by tapping over the net the spreading beech boughs where they hang low and accessible. We are almost sure to find one beetle at least in the net, a little grey brown thing, that hops about with surprising agility; it is *Orchestes fagi* (the Orchestes of the beech), Fig. 11, Plate IV. Possibly it may be remembered that we beat another member of the same genus—*Orchestes rusci*—out of birch on our first expedition. This present species is very similar in shape and size, but inconspicuous in colour, being black and covered with a thick grey-brown

pubescence or down which gives it a dull appearance; the long beak or rostrum in the front of the head proclaims it to belong to the group *Rhynchophora*, weevils, and the great muscular hind thighs thickened for leaping that it is one of the genus *Orchestes*. The species is common wherever the beech grows throughout the kingdom.

Another weevil, but one belonging to the wood-boring section called *Scolytidæ*, we shall most probably dislodge from the clematis if we can beat the older stems into the net. It is a minute cylindrical shining red-brown beetle, 2 to 3 mm. long, which under the glass we can see to be covered with long stiff greyish bristles, the thorax longer than broad, with the corners rounded, the elytra marked with distinct and close punctured striæ: its name is *Xylocleptes bispinus* (the two-spined Xylocleptes), Fig. 1, Plate IV., so called because in the male sex the apex of the elytra are hollowed out and furnished on each side with a strong sharp tooth. There is only one British species of this genus and no other common beetle can be beaten out of the Clematis; nor is it much use attacking the Dogwood or Guelder Rose, which fringes our lane. Further on indeed these disappear and the lane becomes a mere cart track across the shoulder of the Down. By its sides flints of every size lie plentifully strewn among the scented thyme and yellow rock rose, and masses of wild marjoram. Let us turn over some of these and discover what may lie beneath them. Our first beetle is almost sure to be one of the *Geode-*

phaga called *Brachinus crepitans* (the detonating Brachinus), Fig. 18, Plate IV. It is so named because it has the power when disturbed, which it very occasionally (and not invariably, as might be gathered from some of the books) exercises, of ejecting from its body a volatile fluid which vaporizes on contact with the air with a slight explosion. Sometimes quite a number of these beetles may be disclosed under one stone; they vary a good deal in size, but are usually about 8 mm. long, the head and thorax are rust-red, the thorax longer than broad and narrowed behind with a distinct groove down the centre, the elytra oval, bluish or greenish-black and dull, which is due to the fine pubescence with which they are covered, the legs and antennæ reddish. It will be noticed that the elytra leave just the tip of the hind body or abdomen exposed, which shows that *Brachinus*, like the *Dromius* (Fig. 7, Plate III.), belongs to that division of the *Geodephaga* known as *Truncatipennes*, of which that point of structure, *viz.*, that the elytra do not quite cover the abdomen, is characteristic. There are two other *Brachini* of which ancient and very doubtful British records exist, but as none have been captured for at least fifty years we need not take them into consideration.

Another beetle of rather striking appearance we are likely to find under some of these loose stones, and that is *Badister bipustulatus* (the two-spotted Badister), Fig. 15, Plate IV. This is a moderate sized insect about 5 mm. long, with a black head, a red

thorax strongly contracted behind, and oblong elytra shining red-yellow with a blue-black spot or patch about the middle of each, leaving the apex red-yellow; legs and antennæ reddish. It is fairly common on the Downs, but the three other species of the genus are all very much rarer; one very similar to *bipustulatus*, but larger, called *B. unipustulatus*, one smaller, quite black, *B. peltatus*, both of which occur in muddy places by the side of water, and one, the smallest of them all, *B. sodalis* (3½ mm.), which can be sometimes found in the damp layers of fallen leaves in beech woods.

Our next capture is of another Geodephagous genus, which we have not so far met with, although most of its species are rather common,—that is, *Calathus*. The form reminds one of *Amara*, the same regular oval with the thorax not narrowed behind; possibly the first species we shall find will be *Calathus flavipes* (the yellow-legged Calathus), Fig. 19, Plate IV., length 8 to 10 mm., in colour a dull dead black with legs and antennæ which are rather long, red-yellow, the elytra plainly striated or grooved. These *Calathi* can be distinguished from most of the other *Geodephaga* of about equal size, by their oval instead of oblong form, and from the *Amara* which they most resemble in this respect by the absence of the metallic gloss, which distinguishes those beetles. We have seven British species of *Calathus*, the most widely distributed being perhaps *C. melanocephalus*, which is smaller than *C. flavipes* (6 to 7 mm.). In this species the head and

elytra are dull black and the thorax, antennæ and legs reddish-yellow, and we are exceedingly likely to find it under one of these flints; then there is *C. cisteloides*, also a common beetle very similar to *flavipes*, but much larger (9 to 12 mm.), also entirely black. The other four species are not so generally distributed—one brownish yellow, *C. mollis*, occurs on sandhills by the coast; another, *C. fuscus*, also brownish, is also a a shore species, but much rarer, *C. micropterus*, of a rather darker brown, is to be found on moors and mountain sides among heather, and *C. piceus*, another black species, in woods under logs and fallen branches.

So far we have met with only beetles of the group *Geodephaga*, under these stones, and if we went on turning over all the large flints on the long slope of the Down we might meet with several more interesting and perhaps rarer species. But there are other methods of collecting which may enable us to discover beetles of other groups;—usually there is something to be got out of the thick moss which carpets the more exposed slopes, and then there are those quiet hollows and sheltered folds or some deserted chalk pit, where grows the special cretaceous flora,—the thick masses of the viper's bugloss with its small blue flowers, the yellow St. John's wort, the clustering wild marjoram and rock rose, and here and there perhaps tall spires of mullein and clumps of scrophularia or pale blue succory. Surely out of all these some beetles can be dislodged by the sweep net. Let us try this viper's bugloss to begin with; two species we are pretty sure

to find in the net before we have swept very far. One is particularly active and leaps about with all the agility of another insect better known than liked, called *Pulex irritans*; a good many will so escape, but it will be in some numbers and at last we can get a wet finger on one and transfer it to the laurel bottle. It is one of the genus *Longitarsus* which belongs to the group *Phytophaga*, and is one of the largest genera of a section or family of that group called *Halticidæ*. This family contains about eighteen British genera, all of which have the power of leaping long distances largely developed; for this purpose, like the *Orchestes*, whose acquaintance we have already made (Fig. 11, Plate IV.), the hind thighs are very much thickened and of course the muscles which work them correspondingly developed. This species we have now swept from the bugloss is *Longitarsus exoletus* (the full-grown Longitarsus, alluding to its size), Fig. 7, Plate IV. It is one of the larger members of the genus, attaining a length of 3 mm., oval and convex, the head dark, the thorax reddish-yellow and the elytra straw-coloured, sometimes with a median line somewhat reddish, the whole surface finely punctured. The antennæ are very long, reddish-brown with the first joints yellow; the legs also are long, more especially the hinder pair and the hinder thighs, as already stated, very strongly thickened, and dark brown; the size, colour and these dark hind thighs will enable us to recognize this species, especially as it is the only *Longitarsus* which we are likely to sweep in numbers off the viper's

bugloss. But *Longitarsus* is a large genus of more than thirty British species, many of which are exceedingly difficult to make out even when we have taken them. Perhaps the plants on which they feed and from which we may sweep them afford as good a guide as any other as to which species they may be ;— for instance, somewhere in the hollows of this chalk slope the woodsage is sure to grow and by sweeping that plant in the late summer we shall certainly take in profusion a much smaller *Longitarsus* than is *exoletus*, being under 2 mm. long, entirely straw-coloured, with a rather darker head, legs entirely pale ; this will be *L. membranaceus*. Then, if we can find some ragwort, a common enough plant, anywhere, we shall take one larger than *exoletus*, in fact one of the largest Longitarsus we possess, entirely reddish-yellow, which will be *L. jacobææ*, and another smaller under 2 mm., rather more oblong and flatter in shape, also entirely straw-coloured with very weak punctuation which will be *L. gracilis*. Another, certainly the most abundant of the genus which we can sweep from almost anything and which varies in colour from pale brown to almost black with very strong punctuation, is called, *L. luridus*. Several other species we can take on the downs—the thyme ought to yield us *L. obliteratus*, a small species entirely black, and the mullein the largest species we possess—*L. verbasci*.

But returning to our viper's bugloss, we shall notice, besides the *Longitarsus*, a small greyish-black insignificant looking beetle, oblong in shape, with short legs

and short clubbed antennæ. With a glass this greyish appearance will be seen to be due to the thick grey down with which it is covered. This is *Meligethes murinus* (the mouse-like, *i.e.* grey, Meligethes), Fig. 5, Plate IV. It is about 2 mm. long, and its distinctly clubbed antennæ show that it is one of the group *Clavicornia*. The whole surface of the body is closely punctured and all the tibiæ, or second leg joints, are flattened out and enlarged, the peculiarity of the genus *Meligethes* being that these tibiæ of the front pair of legs are toothed along their whole outside edge, in some cases quite finely and in others coarsely; and it is the character of this serration which to a great extent determines the species of this genus. In this case the teeth are regular, but rather coarse, much coarser than in *Meligethes æneus*, a species we have already taken.

We shall not find much more of interest especially attached to the viper's bugloss, but if we turn our attention to the St. John's wort, *Hypericum perforatum*, we may do better.

By sweeping this plant we ought to find a beetle of a genus we have not yet met with,—that is, *Chrysomela*,—and our species *Chrysomela hyperici* (the Chrysomela of the St. John's wort), Fig. 16, Plate IV. *Chrysomela* is a genus of the *Phytophaga*, but one that has nothing to do with the *Halticidæ* or leaping division of the group. They are almost round, very convex, slow moving beetles, above the average size of our other *Phytophaga*, with legs in which all the tarsal

joints (feet) are enlarged, and flattened out, and whose colours are usually rather effective, not to say flamboyant. This particular species attached to the St. John's wort is about 6 to 7 mm. long, oblong, and very convex in shape, of a shining coppery-purple or coppery-green colour, the antennæ almost black, the thorax broader than long, exceedingly finely punctured at base, the elytra finely punctured all over with, in addition, several series of deep and strong punctures running in lines from base to apex, the legs dark; it is fairly common wherever its special food plant grows in the south of England.

We have sixteen British species of the genus *Chrysomela*, the smallest of them not less than 6 mm. long. *C. polita* is common, nearly everywhere in marshy places; it is easily recognized by its golden green thorax and golden brown elytra. Then there is *C. staphylea*, which turns up in many places by general sweeping, entirely shining yellow-brown; others are more local. The most beautiful of them all, in fact of all the British *Phytophaga*, *C. cerealis*, Fig. 6, Plate B, whose eyltra are adorned by alternate bands of coppery-purple and golden-green, has so far in all the British Isles been found but in one restricted area on the slopes of Snowdon, where it feeds on the mountain thyme; for another, *C. sanguinolenta*, dark indigo-blue, edged with red, one must make an expedition to the Ultima Thule of Orkney or Shetland,—the others are more generally distributed, but cannot be considered as common, except quite locally.

There is another genus of *Phytophaga* which comes near *Chrysomela*, called *Cryptocephalus*, whose species are smaller and more oblong and parallel sided, with the head bent down so as to be nearly concealed by the thorax; they are also rather conspicuously coloured, and one of the most brilliant of them we may very likely find crawling about somewhere or sweep it off the herbage of the Downs. This is *Cryptocephalus hypochœridis* (the C. of the Hypochæris, a plant like hawkweed), Fig. 17, Plate IV. It is about 5 mm. long, of a shining silky golden-green colour, often with coppery or bronze reflections; the thorax is conical and finely punctured, with the head hidden beneath its front margin, the elytra rather uneven and roughly punctured, the antennæ long and quite black, legs of moderate length and also black.

Cryptocephalus is one of the largest genera of beetles; it contains at present about seven hundred species spread over the whole earth; of these we possess in this country about nineteen. The most frequent is a small black species, *C. labiatus*, 2 to 3 mm. long, which one can generally beat out of young birch trees. Then there is a species very like *hypochœridis*, but rather larger—6 to 7 mm., of a brilliant golden-green with less of the coppery tone which usually distinguishes that insect; its name is *C. aureolus*, Fig. 5, Plate B, and it can often be found in numbers sitting in the flowers of hawkweed. There is one other which we might find by sweeping among the long grass on the Downs, *C. pusillus*, not more than 2 to 3 mm.

long, usually of a brownish-yellow colour, but rather variable, being sometimes blotched or spotted with black, but there is always a narrow black central line, and the elytra are marked with rows of deep and strong punctures, which are also black.

The other species of *Cryptocephalus* are all more or less rare and we are not likely to find them unless we go and search for them in their special localities.

But we may discover something new if we gently shake over the net these tall plants of mullein with their grey velvet leaves and spire of yellow flowers. There is a genus of *Rhynchophora* or Weevils of rather singular aspect, the whole of whose members—and we have six in this country—feed either on species of *Verbascum*, that is mullein, or on *Scrophularia*, which is sometimes known as figwort. This genus is called *Cionus*, and two of them we shall probably find in the net shaken from the mullein—the first and larger, *Cionus hortulanus* (the garden Cionus, not a specially appropriate name), Fig. 14, Plate IV., is from 4 to 5 mm. long, the body very convex short oblong, with a conical thorax which looks disproportionately small and a long thin rostrum. It will lie motionless in the net for some time with its legs and rostrum folded in so that one would mistake it for some kind of seed—but when it does unroll we may see that it is generally of a grey-brown colour, with two very distinct velvety black spots on the median line of the elytra, one quite at the apex and one a little above the middle. Examined more minutely with the glass both

thorax and elytra will be seen to be covered with greenish-grey scales, the elytra bearing four black raised lines, each of which are marked with a regular series of dots of white pubescence. The legs are also black variegated with grey, so that the whole insect has a rather tessellated look, but the two large black spots on the elytra are very conspicuous and will distinguish the species at once; the rostrum is quite black and the antennæ reddish. The other species *Cionus blattariæ* (Latin *blatta*—some sort of beetle), is considerably smaller, about 3 mm., and whiter, but of the same swollen, short, oblong shape, the two black spots on the elytra are much larger, especially the upper one, which is often double,—the greenish-grey pubescence of *hortulanus* is replaced by white, and the black and white spotted lines on the elytra are more irregular, the legs also are reddish variegated with white. Both of these *Cioni* we might also take from the *Scrophularia*, and also another species—*Cionus scrophulariæ*—which is a trifle larger than *hortulanus* and almost black, but of the same general scheme of coloration; in this case, however, the two black elytral spots which are not nearly so conspicuous, owing to the ground colour being almost black, are accompanied by patches of white pubescence, which makes them the more visible.

But having now swept and shaken and taken toll of these plants of the chalk, let us turn to what after all is perhaps the most efficacious method of collecting beetles on the Downs, I mean an examination of the moss and small loose gravelly *débris* that covers their

more exposed slopes. For this purpose the most efficient implement is a small rake head, some six to nine inches wide, fitted to a detachable handle of about a foot long. If we carry a knapsack of any kind this can be easily carried to the scene of operations;—the stones may be simply raked over on the ground, the moss torn up and shaken over the brown paper, which should always form part of our equipment.

There are two species, both of the group *Geodephaga* and both of that division of the group called *Lebiina*, of which the first capture we made, viz., *Brachinus crepitans*, was one, which we are likely to capture by either of these processes,—the first a very small beetle, only about 2½ mm. long, whose name is *Blechrus maurus* (the obscure Blechrus), Fig. 4, Plate IV. The whole insect is entirely glossy black, the head large and smooth, the thorax very much narrowed behind and longer than broad, with the hind angles obtuse, the elytra quite smooth, the end of the abdomen being often slightly turned up so as to show plainly that the elytra do not quite cover it. There is only one British species of the genus, although there are three in a genus that is exceedingly like it called *Metabletus*, but the commonest of these *Metabletus fovoela* is more dark bronze than black. Another, *M. obscuro-guttatus*, has, as its name implies, two obscure light spots, the third, *M. truncatellus*, is very like our *Blechrus*, and we might quite possibly find it also on this Down side; it is about the same size, but whereas in *Blechrus* the thorax is slightly longer than broad,

in this *Metabletus* it is distinctly transverse, that is, broader than long.

Our second species is quite unlike either of them; it is a very common beetle, almost anywhere, and can be taken by sweeping as well as in moss. It is called *Demetrias atricapillus* (the Demetrias with the black hair-like line), Fig. 9, Plate IV., much larger than the *Blechrus*, being over 5 mm. in length, narrow, parallel sided, and elongate, with a long black head, a small red thorax, longer than broad and much narrowed behind, and straw-coloured elytra with a narrow black line down their centre (whence its specific name) and a series of rather fine punctured lines, the punctures being darker, down each elytron, legs and antennæ yellow-red. There is only one other species of the genus *Demetrias* in this country; it is called *D. unipunctatus* and differs from *atricapillus* by having a black spot at the apex of the elytra, otherwise it is very similar but much less common. It can be found on the sand hills of Deal, in the fen country and a few other localities.

There is one other beetle belonging to the same section but much more resplendent than either of these two last captures, which if luck favours us might drop out of the disrupted moss; if so, we shall know it directly as it runs across the paper. It is about 6 mm. long, with the head and elytra shining bluish-green and the thorax red. This is *Lebia chlorocephala* (the green-headed Lebia), Fig. 12, Plate IV. The antennæ are black, with the first three joints red, the thorax broader than long with the posterior angles distinct right angles, the elytra oval,

rather wider behind, faintly punctured and striated, and the legs red. This is one of the most effectively coloured Geodephagous beetles we possess; it is by no means common but is fairly widely distributed over the country and is in some way associated with broom, out of which it can sometimes be beaten. There are four other species of *Lebia*, one rather similar to *chlorocephala* called *cyanocephala*, but rarer, and differs in having only the first joint of the antennæ red instead of the first three, and also the legs black and red instead of quite red. This species can sometimes be taken in moss or under stones on such places as Box or Buckland Hill, the other three species are all excessively rare. Then we ought to find among the small stones or at the roots of the grass certain species of *Brachelytra*, which it will be remembered is that section of *Clavicorina* with very short elytra and very long flexible hind bodies.

The first is pretty sure to be a small reddish beetle, very fusiform in shape—that is, narrowed to a point at either end—called *Tachyporus chrysomelinus* (the gilded Tachyporus), Fig. 10, Plate IV.; it is only about 3 mm. long, with the head black, the thorax rufous, the elytra brownish red, darker at the margins, especially the sides, and hind body black, the legs reddish yellow and the antennæ black with the first few joints red. The peculiar shape, small size and black and red coloration will always distinguish a *Tachyporus*, but to separate the species is more difficult—there are about a dozen British species of them, but this and another called *T. hypnorum* are by far the most abundant, in fact one can hardly

shake out a handful of moss anywhere in the Kingdom without dislodging *T. hypnorum;* it differs from *chrysomelinus* in having the thorax black with the margins only red instead of being entirely red.

Another Brachelytron very much larger and of quite a different aspect we shall probably rake out of the Down side—a species known as *Astilbus canaliculatus* (the channelled Astilbus), Fig. 8, Plate IV. What strikes one first about this beetle is its heavy thickened antennæ, its very small elytra, swollen hind body and long legs. It is quite 4 mm. long, in colour a dull chestnut brown, with the head and a ring just above the apex of the hind body almost black. It can be at once distinguished by its thorax, which is small and oval in shape with a wide channel or indentation (whence its name) down the centre; the antennæ are rather long and black except the first three joints, which are reddish, the legs a rather lighter brown than the body.

A. canaliculatus is quite a common beetle in chalk and limestone districts, and as there is but one British species in the genus it is easily recognized.

If we carefully examine the paper over which we are pulling this moss to pieces, we may notice a small reddish brown insect which looks perhaps more like some small spider than a beetle. It is one, nevertheless, and introduces us to a type we have not hitherto met with either in size or shape, being much smaller than any species we have yet seen, and quite unlike our general conception of what a beetle ought to be. It is called *Pselaphus heisei* (after some defunct German coleop-

terist), Fig. 3, Plate IV. It belongs to the great group *Clavicornia*, as can be seen from the distinct club of its long antennæ. The most characteristic feature, however, is its excessively long clubbed and jointed palpi, which look almost like a second pair of subsidiary antennæ. Its extreme size is 2 mm. long, the head broad with prominent eyes, the thorax very small of a long oval shape and the hind body conical, so that the junction of thorax and elytra make a very distinct "waist." The elytra, which under the glass can be seen to be plainly grooved, are shining red-brown and only about half cover the abdomen, but that does not make it in the least like any member of the Brachelytra; the legs are very long, red-brown like the rest of the body. There is only one other and that a very rare member of this genus, but in the family *Pselaphidæ* there are quite a number of genera and of species, all very small, none of them, in fact, reaching 2 mm., which have the same general look as this *P. heisei*—the long heavy antennæ, the very long heavily clubbed palpi, conical abdomen and abbreviated elytra, black, brown or dark red in colour. Some occur in moss, others in rotten wood or vegetable refuse, but they are all so small and inconspicuous that unless one keeps a special look-out for them they will probably escape notice.

There is a large genus of the *Brachelytra* called *Stenus* (of which a species will be seen on Plate III., Fig. 11) which have quite a characteristic look unlike any other of the sub-group, a broad head with large projecting eyes, antennæ distinctly clubbed, a narrow thorax, their

hind body tapered off to a point and long legs; they are nearly all entirely black, and very coarsely punctured. The colour of the legs, however, varies considerably, some being black, some yellow, and some part one and part the other; the size extends from 3 to 5 mm. long. They are generally common beetles in wet places, but a few species are attached to dry localities and among these is one *Stenus Erichsoni* (named after Erichson, another German entomologist), Fig. 2, Plate IV., which occurs especially on dry chalky slopes and may well be found among the rubbish we are now investigating. It is about 3 mm. long, entirely black, rather strongly punctured all over, head much wider than thorax, with very large eyes, thorax about as long as broad, with a distinct central channel, legs and antennæ yellow, the latter with the club darker.

The special points which distinguish this species are, that the last two tarsal joints of the front legs are bilobed, that is, heart-shaped, flattened and spread out, that the edges of the exposed part of the hind body below the elytra are slightly turned up (margined, as it is called) and that the elytra taken together are not square or oblong but widened out behind, so that the breadth across the apex is quite noticeably greater than it is across the base. These distinctions, the last one being specific, will require a glass to make them out satisfactorily, but they will distinguish *Stenus Erichsoni* from any other *Stenus* we may happen to take. The species is common in some localities such as Dorking, but rare anywhere away from

the chalk. If we have it at all it will run with considerable rapidity across our paper, and will require a quick finger to transfer it to the laurel bottle. But we must not therefore overlook a little shining red-brown beetle which may also happen to be there and which will move more slowly. It belongs to a genus of which we took one example by sweeping the long grass in the wood (*see* Plate III, Fig. 10); that was *Anisotoma calcarata* and this is *Anisotoma badia* (the walking Anisotoma), Fig. 6, Plate IV. These are the only two in a genus of some twenty-five species which are not quite rare and difficult to secure. Most of them, like *A. calcarata*, are to be taken, if they are taken at all, by sweeping grass under trees in the evening, but this *A. badia* seems to hide in the moss on chalky or limestone hillsides during the day, and perhaps emerge at sunset, although I have never so taken it. It is quite a small beetle, 2 mm. long at the outside, in shape a regular short oval and very convex; the antennæ are short with a very distinct club and the legs short and stiff, the thorax is quite as broad at the base as the elytra, smooth and shining, a point which separates it from nearly all the other species of *Anisotoma*, the elytra are marked by rows of strong punctures. We shall have no difficulty in recognizing this beetle if we take it, as there is no other we are likely to find in this moss at all like it—so small and convex and such a shining rust-red colour.

There are many other species of small *Brachelytra*, *Longitarsus* and *Rhynchophora* which we might rake out of this *débris* of flints, or shake from the masses of moss over

which we must not linger now, but it will be worth while turning over one or two of the larger flints again as we retrace our steps down the slope and just brushing the herbage here and there as we pass. Under one of these flints we ought to find another member of the group *Geodephaga*, that is, *Ophonus brevicollis* (the Ophonus with the short thorax). Fig. 20, Plate IV. This beetle is 7mm. long, dark reddish brown, often nearly black in colour, long oval with rather parallel sides in shape, the thorax often lighter and considerably broader than long, the sides rounded and contracted to the base, antennæ and legs reddish yellow, the thorax thickly punctured at the sides, more scantily on the disc, and the elytra finely punctured all over as well as plainly striated.

Ophonus is a genus which formerly was included with *Harpalus* (of which a specimen is figured Plate II., Fig. 12). Great uncertainty and confusion prevailed as to its species or how many we had of them, until Dr. Sharp lately revised the sub-genus,* so that we now recognize about fourteen species instead of the ten which appear in the earlier lists. Like *Harpalus*, the joints of the front and middle tarsi are dilated in the males in *Ophonus*, but its members may be known from the *Harpali* by their more complete punctuation, both head, thorax and elytra being punctured, whereas in *Harpalus* the head at any rate is always smooth.

Several of the species might occur under stones in such

* "Entomological Monthly Magazine." Second Series, Vol. xxiii., page 181, *et seq.*

a locality as this. One, *O. azureus*, we should know at once, as it is dark blue-green in colour, rather shining, and the only one which is not some shade more or less dark of red or yellow-brown. Out of the fourteen species of *Ophonus* there are about eight which are exceedingly difficult to distinguish and more or less rare. This *O. brevicollis* may be known by its short thorax, and it is also one of the commonest of them all. One or two other of the less rare species are fond of sitting in the centre of the concave umbels of the wild carrot, where I have found them in the Isle of Wight in abundance, but generally it is best for the student of beetles to put aside his *Ophoni*, with their data, till he has accumulated sufficient to be able to compare a considerable number with each other and with, if he can get or borrow them, authentically named examples.

A beetle perhaps more easy to determine we may find in the sweep net if we brush the long grass at the side of the path; it is a long dark green insect with long legs and antennæ and a very narrow body. At first it may remind one of a *Telephorus* or *Rhagonycha* (Plate I., Fig. 16). It has the same elongate form and soft leathery elytra, but there is no *Telephorus* of the dark sage-green colour which distinguishes this beetle, and if we look carefully at the antennæ we shall see they are thread-like all the way up and not toothed or serrate like those of a Telephorus. To allocate it to its proper group we shall have to count (with the glass) the number of joints in its tarsi, and when we find that although the front and middle pairs have the normal number of five, the

hind legs are furnished with only four, we may remember that this is the principal character of the great group *Heteromera*, and rightly refer our beetle to that division. Its name is *Œdemera lurida* (the dark Œdemera), Fig. 13, Plate IV. It is about 6 to 7 mm. long, the thorax is rather narrow, rounded and slightly contracted at base with a raised line down the centre, the elytra rather variable in colour from lightish sage-green to almost black, with a roughened surface and slightly pubescent, with three raised ribs extending their full length from base to apex, and between the central and second a shorter rib extending only about one third the distance. This is a species one can generally sweep up in June in grassy places on the chalk, but it is not common elsewhere. There is one other species in the genus—*O. nobilis*—similar in form but a little larger and of a much brighter and lighter blue-green in colour; it can be known at once by the very much thickened hind thighs (although it does not jump) of the male. This is not specially a Down or chalkland beetle, but can be taken not uncommonly in many places in the southern half of England. It is figured in Plate B, Fig. 9.

But there are other beetles which we may sweep up from the herbage of the Downs which certainly do leap, possibly quite out of the net, unless we exercise some dexterity in their capture. Mention has already been made (pp. 8-9) of certain species of the genus *Longitarsus*, such as *L. exoletus*, *L. membranaceus*, *L. jacoboeæ*, etc. These, it will be remembered, were off special plants, but we are almost sure to sweep up a few more off the general

mixed herbage of such a locality as this. There is, for instance, *L. pratensis* (the Longitarsus of the fields), one of whose food plants is probably plaintain. It is quite a common beetle, only 1 to 1½ mm. long, the head black, the thorax usually reddish yellow, and the elytra straw coloured, with the sutural line (that is, the median line of the back) faintly reddish, the punctuation weak and diffuse, the legs yellow with the hinder femora darker.

This is, however, a very variable species as regards colour, one of its forms, which very often occurs, in which the thorax is brown, sometimes nearly black, is known as *collaris*. Other names, now discarded, have been given to other slightly differing forms, but there is but one *species*, *L. pratensis*, and that, with all its variations, is often exceedingly abundant in the late summer on the rough herbage of the Down side.

Then, if we can find any plants of Hemp Agrimony or Yarrow, we may be sure of another of these *Longitarsi*, that is *L. succineus*. This is another very small species, less than 2 mm. in length, of a pale straw colour almost concolorous, with the final joints of the antennæ and the hind femora slightly darker, both legs and antennæ being plainly longer in proportion to its size than in most other members of the genus, the punctuation feeble and confused. The small size, uniform colour, and food plant (always some species of Compositæ) make this species readily distinguishable.

But another of these leaping beetles is sure, sooner or later, to attract our attention. It is very much larger

than any *Longitarsus*, and of quite a different shape and colour. This will be a *Haltica*, the genus from which all the other genera of these leaping Phytophagous beetles take their family name of *Halticidæ*. This genus *Haltica* is, however, probably one of the most difficult among all our British Coleoptera, although its members are but few.

No one knows with certainty how many species we have in this country, or which they may be, according to the nomenclature of the Continent. They are all fairly large beetles, 3 to 6 mm., and all of a shining dark blue varying into green or purple. Several of them we can name with some confidence, partly perhaps because of their association with special food plants. Thus, one of them, *H. lythri* (the Haltica of the Lythrum) and that the largest of them all, is attached to the Purple Loosestrife. Another, rather green than blue in colour, *H. coryli* (the Haltica of the Hazel) to that tree in several of the woods in the south of England. Then there are at least two—*H. ericeti* and *H. britteni* (named after its food plant and the English coleopterist, Mr. Britten, respectively) which undoubtedly feed on heather. But it is improbable that our present capture is of any of these, much more likely it is to be another species, by far the most abundant of them all, and which can be swept up almost anywhere in the kingdom. It occurs commonly on heaths, but species of *Erica* need not therefore constitute its only food. Its name has been the subject of much confusion among students, and discussion among authorities. Supposed originally to

be what Linnæus meant by *oleracea*, it had been generally known by that name, until Dr. Sharp recently* considering the evidence that this insect was really the Linnæan *oleracea* hardly sufficient, proposed for it the name *H. ytenensis* (*ytenensis* meaning connected with the New Forest, from the name of an ancient British tribe supposed to have been settled there), because he took it in great abundance near Brockenhurst.

This beetle averages about 3½ mm. in length, its colour is shining dark blue, sometimes with a slight greenish or violet reflection, especially on the thorax; it is a long oval in shape, rather flat, with legs and antennæ black; the punctuation of the thorax is exceedingly fine, and of the elytra confused and not very strong, and, as in so many other members of this section, there is a deep transverse groove across the basal half of the thorax.

Any *Haltica* is easily recognised in the net from its comparatively large size, shining blue colour, and power of leaping—but, as I have already said, to distinguish the species is quite another matter, and it is only because this *oleracea* or *ytenensis* is so much more abundant than any other, that we assume our present capture to be that species.

Probably towards the base of the chalk slope we have been traversing there may be some scattered Guelder Rose or Wayfaring bushes, and if we beat the foliage of some of these into the net we shall probably discover a beetle we have not seen before. It is one of the

* See *Ent. Monthly Magazine*, Vol. xxv. (2nd series), 1914, p. 259.

Phytophaga, but not of the leaping section of the group. The genus is *Galerucella* and we have in this country about six species of it. This one from the Guelder Rose is *Galerucella viburni* (named from that tree) all the other species being attached to some aquatic or marsh plant. It is one of the largest of them, the females, which are larger than the males, being often 7 mm. in length. They are yellowish brown beetles oval and flat in shape, with a small head and thorax, and rather long antennæ; there is a small black patch on the front of the head, a black mark down the centre and at the sides of the thorax, the scutellum and shoulders of elytra also black. All the rest of the upper surface is of a dull yellowish brown colour, lighter on head and thorax, darker on elytra, very closely and finely punctured, and covered with a fine close, yellow down; the antennæ are black, and the legs yellow brown.

And so we might go on all the hot summer's afternoon, toiling up the long acclivities of the Downs, and sweeping in their hollows "the green myriads of the peopled grass,"—for certainly to the coleopterist the Downs offer their greatest attractions in the summer. Unlike the woodlands in whose sheltered depths we can find rotten wood, fungi, dead leaves and other refuges and take beetles the whole year round, all we can do on the Downs when there is no herbage to be swept, is to turn over their flints, or tear in pieces their moss, and on those exposed slopes from November to March that is not a particularly inviting form of the investigation of nature, nor would the most patient investigation reward us with

anything more than we could with greater facility and comfort take between the late spring and early autumn. To-day at any rate if we have secured a few of the more characteristic beetles of Downland, we have left many more for future expeditions to discover.

CHAPTER II

The Beetles of the Moorlands

EXCEPT in the far West, Devonshire and Cornwall, the Moorlands of this country all lie north of that line drawn from the estuary of the Severn to the Humber, south of which we find the whole extension of the country of the chalk Downs. No doubt wide areas exist in Surrey, in Berkshire and in Hampshire which can grow little beside heather and ling, but these expanses we must call Heaths not Moorlands, for as we miss even in their remotest solitudes the whirr and cackle of the startled grouse, so they lack much of the distinctive insect fauna of the great Moorlands of the North and North-West. Nor by Moorlands are meant such heathery wastes as Cannock Chase or Chat Moss as it was; although they lie north of the line in question, they are more properly "Mosses," for the genuine "Moorland" one requires a higher elevation. Go north or west of that vast plain of the Trias which occupies so much of North Western England, and there stretching over the flanks of the great mountain systems of Yorkshire and of Wales lie those lonely expanses rising up from the upper reaches of the river valleys, level stretches or long undulating folds of brown heather above which rises the steep

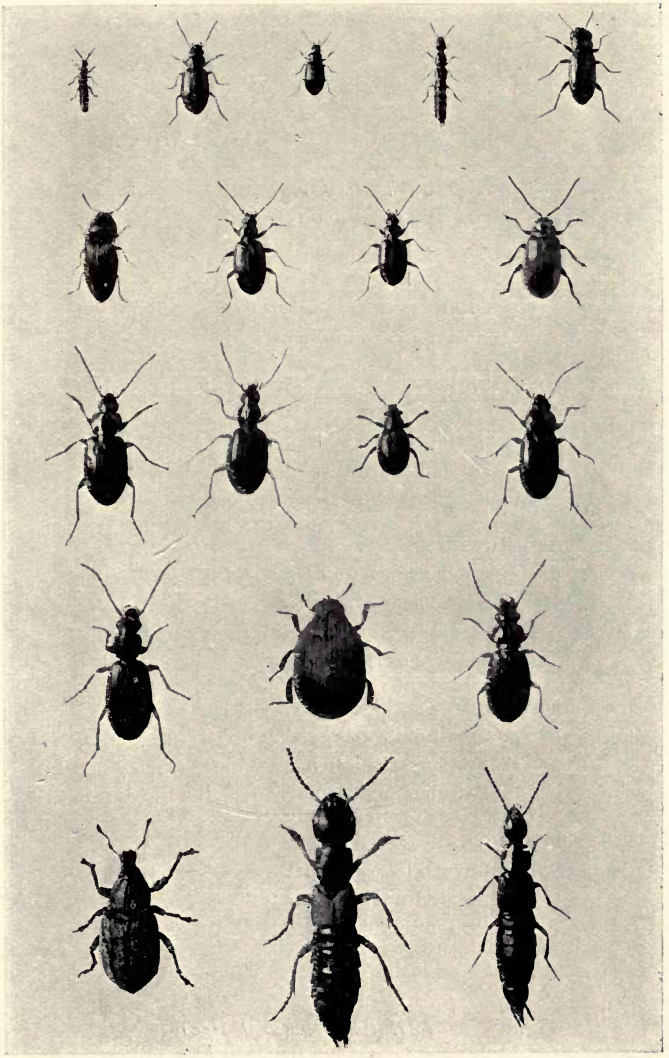

PLATE V. [See over.

PLATE V.

BEETLES OF THE MOORLANDS.

First Row. *From left to right.*

1 Homalota elongatula.
2 Bradycellus cognatus.
3 Bradycellus similis.
4 Othius myrmecophilus.
5 Notiophilus aquaticus.

Second Row.

6 Cryptohypnus riparius.
7 Bembidium tibiale.
8 Bembidium atrocæruleum.
9 Lochmæa suturalis.

Third Row.

10 Anchomenus parumpunctatus.
11 Anchomenus albipes.
12 Strophosomus lateralis.
13 Calathus micropterus.

Fourth Row.

14 Cymindis vaporariorum.
15 Byrrhus fasciatus.
16 Patrobus excavatus.

Fifth Row.

17 Barynotus schönheri.
18 Staphylinus erythropterus.
19 Philonthus decorus

(All twice natural size).

escarpment or abrupt outcrop of the older rocks, Carboniferous, Silurian, Cambrian, which form the substance of the great mountains beyond.

In North and Mid Wales, in East Lancashire and West Yorkshire, in Cumberland, Westmoreland and Northumberland right up to the Cheviots and far beyond them, all through the length and breadth of Scotland extend these open treeless, roadless Moors, where one can wander knee deep in ling and heather all through a summer's day, and hear nothing but the distant bleat of mountain sheep and the wail of the nesting Curlews.

Of course the dweller in London, or anywhere in the South, cannot make his expedition to such places in quest of beetles a matter of a day or even an afternoon as he can in the case of Downland; at least a week-end must be devoted to such a purpose, and any of the main northern lines—Great Western, North Western, Midland, etc.—will carry him *somewhere* whence a comparatively easy walk will achieve the rest. As to the exact *terminus ad quem* we must be guided by maps unless we know the country we propose to visit rather intimately. Perhaps it may be best, since this chapter is devoted to the illustration of some of the beetle fauna of the Moors, to take some concrete example and to imagine us, after a few hours' railway journey from Paddington or Euston, arrived at one of those small towns or villages which are to be found on the upper courses of one of the rivers of North Wales—such as the Dee, the Clwyd or the Conway—an old bridge, a still older stone church, a comfortable inn much frequented by anglers, a flannel mill or a slate

quarry, are perhaps the salient features of the place. Behind the town the valley slopes gently upward—first a belt of arable land tilled by scattered farms, then more extensive sheep runs melting gradually into the brown reaches of heather, and far in the distance the peaks and ridges of the line of hills that delimit the valley. Our purpose is to reach these higher solitudes, and to do this most effectively we must discover on the map where some small stream which, rising high up in the recesses of these distant hills, cuts its tortuous way through the intervening moorland and sheep runs " to join the brimming river." From that point of juncture next morning we shall do well to start and, following its course, gradually ascend to the uplands beyond. Our equipment need consist of little else than the few sheets of strong brown paper, laurel bottle and tubes we usually carry, and the absence of a sweeping net or sieve will leave room in our bag for the provisions indispensable for a day on the moors.

For such an expedition as this no time is more suitable than those few halcyon days of early spring which the first week or two of April often bring us; later on in the summer the heat makes the long, shadeless, uphill tramping through the heather too arduous an undertaking, and in the writer's experience, beetle life in such places is much less abundant after than before May is ended, and of course in the autumn we become possibly unwelcome intruders in areas dedicated to the slaughter of grouse.

Usually a high road runs through our little town and continues by the side of the main river—over-arched by

the sycamores that love the shelter of the valley bottom and the moisture of the riverside; it crosses our little tributary brook by a bridge, and there leaving it we must strike up through the woods that for some little way clothe the sides of the lateral defile which our stream has eaten out, probably through the moraine left by some ancient glacier that once blocked the whole valley. The sycamores soon give place to birches or perhaps larches, and under their shade the stream slips quietly among its boulders. Now and then, perched on some large stone in mid-stream, we may catch sight of a white breasted "dipper," or equally unfamiliar bird to the visitor from the South, the grey wagtails as they run about in their jerky way by the brook's margin. Big stones lie scattered on the thick soft moss under the trees, and by their inversion we may commence the day's work of beetle catching.

The first is evidently one of the *Geodephaga*, a pitch-black beetle, which in shape and size somewhat reminds us of a *Leistus* (see Plate II., Fig. 8), but it really comes systematically a long way from that genus, in fact quite at the other end of the group. It is *Patrobus excavatus* (the Patrobus with the hollows, alluding to the deep foveæ of the thorax), Fig. 16, Plate V., about 7 to 8 mm. long, with antennæ and legs pitchy-red, the head rather long with a deep furrow on each side behind the eyes, the thorax very much rounded at the sides and contracted at the base with the hinder angles sharp right angles, a distinct groove down the centre and a deep excavation or pit on each side just at the hind corners.

The whole base and the centre of the front margin are deeply punctured, the elytra a rather long oval somewhat faintly striated. The genus *Patrobus* comes next to *Trechus* in our lists (see Plate II., Fig. 1), but our three species are all much larger than any British *Trechus*, and resemble each other very much, all being of a dark pitchy or brown-black colour without markings. Of the other two, one is exclusively a Scots and the other quite a mountain species. This genus, quite northern and western as it is in its range, is a good example of what has been termed the " Keltic " element in our insect fauna, that it to say, it represents a number of species which probably were native to Great Britain when these Islands formed part of a great extension of North-Western Europe into the North Atlantic Ocean, possibly before the Glacial Age, certainly before the great influx from the Continent across what is now the North Sea on the cessation of glacial conditions, of the vast majority of our fauna which now have their centres of greatest abundance in the East and South of this Island. Possibly, once commonly and widely spread over the whole country, these " Keltic " species have been forced, partly by the changed conditions of climate, partly by the competition of new arrivals from the South-East, into those remote fastnesses of North-Western England, Wales, Scotland and Ireland, where we find them to-day.

We may meet on these moors with several such beetles of a more ancient lineage than those we find on the Downs, and still more were we to ascend the mountain

peaks which stand out on the distant horizon or get away into Scotland or Ireland.

The next beetle we find hidden under a large stone near the brook side may very likely be one of the larger *Brachelytra*, a sub-group we are now able to recognize by their very short elytra and long flexible hind bodies. This present species is a rather large beetle, quite 15 mm. long, black with the elytra clear brick-red, the first three joints of the antennæ and the legs also red, and in quite fresh specimens there are little patches of golden hair or pubescence on the front of the head, the scutellum (the little triangular plate at the base of the elytra), and on some of the segments of the hind body; the head is large and broad, evidently larger than the thorax, the antennæ rather short and thick, the thorax a little longer than broad with the hinder angles rounded off, densely and finely punctured all over, the scutellum back clothed with the golden pubescence already mentioned, the elytra together nearly square, punctured like the thorax, hind body quite black. Its name is *Staphylinus erythropterus* (the red wing [cased] Staphylinus), Fig. 18, Plate V. We have four of these fine large *Brachelytra* with red wing cases belonging to the genus *Staphylinus*, none of them at all common, the largest of them, *S. cæsareus*, much resembling an ordinary "Devil's Coach Horse," with red elytra, and is not so rare in Ireland as it is in this country. Then there is a smaller species, *S. latebricola*, which we find sometimes in the South, especially the New Forest. This *S. erythropterus*, and one very like it *S. stercorarius*, neither of which is

common anywhere, but are less rare in the North than in the South.

Another Brachelytron we are almost sure to find under these stones is *Philonthus decorus* (the handsome Philonthus), Fig. 19, Plate V. It is above the average size of the *Brachelytra,* being quite 11 mm. long, and is entirely of a coppery bronze colour, dull on the elytra owing to their dense punctuation, but shining and with a slight greenish reflection on the head and thorax, and to some extent on the hind body, the antennæ and legs pitch black. We have already met with *Philonthus politus* (Plate II., Fig. 9), a near relative of this species. They both belong to that section of the large genus *Philonthus* in which the thorax bears a double longitudinal row of three visible large punctures, but as there is no other *Philonthus* in this country so large and entirely bronze coloured as this is, we shall have no difficulty in recognizing it.

Under stones close down by the water's edge we may come upon another and smaller *Philonthus* (*P. fulvipes*, the Philonthus with the yellow legs). It is only about 5 mm. long, and has four visible punctures on the thorax, the head and thorax are shining black and the elytra bright red, antennæ dark with the first three joints and legs reddish yellow. This also is an easily recognized species, as it is our only small *Philonthus* with bright red elytra; it occurs very rarely by the side of some of our Southern rivers, but is not at all uncommon in North Wales.

Under one of the larger stones, or a fallen log in the thicker moss, we may discover lurking a large black

Geodephagous beetle which at first sight looks something like a Carabus (Plate A, Fig. 1), but its long head, projecting palpi, small thorax, and long legs will distinguish it at once from any member of that genus. This is *Cychrus rostratus* (the beaked Cychrus), Fig. 2, Plate B, and the only species we have of the genus. It has the power of emitting a peculiar creaking noise by rubbing its abdomen against the edges of its elytra, as we shall discover if we pick it up. It is about 16 mm. long, uniformly deep blue black in colour. As we have said, the head is small and long, with large eyes and very long palpi, the thorax disproportionately small, rounded at the sides and contracted in a curve to the base, the elytra oval and very convex, and the whole surface of the beetle of a rough granulated appearance; it is not a common species although widely distributed, and occurs in the hilly regions of Wales perhaps more commonly than elsewhere.

Then there is another small Brachelytron we are almost sure to find in this moss, by pulling it to pieces or under some stone; it is *Othius myrmecophilus* (the Othius that is the friend of ants, although more often than not it is quite unassociated with any kind of ant), Fig. 4. Plate V. We have already met with one *Othius* in dead leaves (see Plate III, Fig. 12), and this is the same build of insect only much smaller, being only 5 mm. long. It is a very thin agile beetle with a long oblong black head nearly as large as the thorax, which is also oblong in shape, with the corners rounded off, and yellowish brown in colour; the elytra are rather longer than broad,

somewhat strongly punctured, darker in colour than the thorax, with the edges often lighter and the hind body black, the antennæ short, reddish colour with the first joint long and the last two or three very short, the legs yellow. This *Othius* can be found in moss, in woods in most parts of the country, but seems more especially abundant in the North and West. And now the wood in whose shadow we have been hitherto walking begins to thin out, the brook is still fringed by a few stunted birches and alders, but where the larches end we step out on to the open grass of the hill side, the lichen covered rock crops out here and there among the grass and fern, or forms little shelves over which the brook rushes with the pleasant sound of broken water. A little higher and perhaps we come to a more level stretch, and here the stream has widened out and about its margin lies a shingle of small water rounded stones.

Under these stones and among the wet gravel in which they lie we shall certainly discover several species of *Anchomenus* and *Bembidium* which we have not hitherto met with. They are both, as may be remembered, genera of *Geodephaga* (see Plate II., Figs. 2 and 16). The *Bembidia*, generally small active beetles, known by the very minute needle like last joint of the maxillary palpi; the *Anchomeni* rather larger, graceful in shape, with rather long legs and antennæ, and often brightly coloured. Our first capture, made perhaps where the stones lie with their lower surface actually in the water, will be one of the latter called *Anchomenus albipes* (the

white, *i.e.*, pale legged Anchomenus), Fig. 11, Plate V. This is a rather larger species than the *A. dorsalis* we have already taken, nearly 8 mm. long, shining brownish black with the extreme edges of the elytra paler, very pale yellowish legs, antennæ, and palpi, the thorax rather longer than wide, rounded at sides and much narrowed behind, with the base strongly punctured, and elytra with distinct striæ but unpunctured. This is usually a very abundant beetle along the margin of these upland streams, half a dozen of them often lurking under one stone.

Another *Anchomenus* not quite so gregarious we shall also probably encounter; this is a much more brightly coloured insect about the same size called *Anchomenus parumpunctatus* (the slightly punctured Anchomenus), Fig. 10, Plate V.; the head and thorax are usually a shining metallic green and the elytra coppery or purple, equally bright and shining, but some specimens are very much brighter than others, and occasionally individuals occur almost black; the thorax is more equally rounded at the sides and not so much arrowed behind than is that of *A. albipes*, the elytra are similarly striated with three or four large punctures scattered over their surface, antennæ black, as are also the legs with the tibiæ (second joint) lighter. This is like *albipes*, a widely distributed beetle in the shingle at the margin of streams and rivers all over the country. Then there are four species of *Bembidium* which we should find either here or under shingle, somewhere else along the course of the stream. These species resemble each other very much; they are

all about the same size, 4 to 6 mm., and all dark coloured without spots and shining. The first and perhaps the commonest is *Bembidium tibiale* (the Bembidium with characteristic tibiæ), Fig. 7, Plate V., quite black with just the slightest bluish or greenish tinge, thorax about as broad as long, sides slightly rounded but not much contracted at base, with a central furrow and hollowed out and punctured at the hinder angles; elytra very plainly striated but not punctured, antennæ dark brown with first joint red; of the legs the first joint (femur) is black, the second (tibia) reddish, and third (tarsus) brown. The next species, which is usually not quite so common, is *B. atrocœruleum* (the blue-black Bembidium), Fig. 8, Plate V.; it is exactly like a small edition of *tibiale* with these points of difference besides the size, the colour rather more bluish, the thorax more narrowed behind, and the elytra rather narrower and longer in proportion.

The next, *B. decorum* (the beautiful Bembidium) is sure to be common. In size it comes between *tibiale* and *atrocœruleum*, but it can be at once recognized by its much brighter blue colour, entirely red legs, and flatter shape; the thorax resembles that of *atrocœruleum*. Then there is *B. punctulatum* (the punctured little Bembidium), of the same size as *decorum*, but instead of being at all blue, it is black with a faint coppery or brassy reflection. What, however, principally distinguishes it from the three we have just noticed is that the whole of the head and thorax are very distinctly and strongly punctured.

There are several other Bembidia which we *might* find in such a situation as this, as the majority of this genus, which is the largest we have in *Geodephaga*, frequent wet places, but these four we have mentioned we shall hardly fail to meet with.

Among them we shall no doubt notice—at any rate if we shake out some of the finer wet shingle over a sheet of brown paper—certain very small *Brachelytra*, smaller and narrower than any we have yet met with, being not more than 3 mm. long. These will probably be members of the largest genus we have of British Beetles called *Homalota*, and likewise undoubtedly the most difficult in the separation of its species. There are about 160 British species at present enumerated in our latest list, all minute obscure little beetles, many of them very rare, and the position and specific validity of many of them by no means of universal agreement among coleopterists. However, this species just found among the shingle will probably be *Homalota elongatula* (the long thin little Homalota), Fig. 1, Plate V., which is one of the commonest and most certain of them all; it is brownish black with the elytra yellow-brown, the hinder edge usually lighter, the thorax about as long as broad, with rounded angles, antennæ brown and rather long, legs yellow. This is a species which is always abundant among the shingle or in the moss of these mountain streams. Of course many other species of *Homalotæ* occur there also; in fact, wherever we may be collecting we shall be continually coming across members of this genus, black or brown dull little things, the majority

smaller than *elongatula;* only a few can be made out and named without the aid of the compound microscope, and we may as well defer their study till we have some considerable acquaintance with the larger *Brachelytra* and some members of well set specimens of Homalotæ.

So gradually ascending, the grass merges more and more into the ling and heather, and the brown stretch of moorland grows wider to the view, the Dippers and the Gray Wagtails are left behind—possibly we may catch sight of a Ring Ouzel—the Blackbird of the moors—possibly a startled Sandpiper may rise and disappear with low swift flight like that of a snipe as we suddenly rise above some shelf of rock or turn some corner of the defile. In May we might find its four pointed eggs laid among the thick grass or heather close down by the water with hardly the pretence of a nest, in fact, almost tread on them unless the bird was sitting and rose as we approached, so perfectly does their dull olive brown, blotched with darker red, brown correspond with the heather stems and broken shingle of the brook side.

But before leaving these wet stones there is one other beetle we ought to find among them, and that belongs to a group of which we have so far seen no representatives on the moors—I mean *Cryptohypnus riparius* (the [river] bank Cryptohypnus) Fig. 6, Plate V. *Cryptohypnus* is a genus of the *Sternoxi,* a sub-group of *Serricornia,* those jumping beetles of which we have met with several examples in the course of our

expeditions. This is a dark brown insect, nearly black with a distinct bronze reflection; it is 5 to 6 mm. in length, in shape a long oval gradually narrowing to the apex with a large convex thorax, slightly rounded at the sides with the hinder angles drawn out into a kind of spine on each side which fit the base of the elytra so that the outline of thorax and elytra is continuous and nearly straight. Both are finely punctured and covered with a very fine scanty down, and the latter are faintly striated; the antennæ are black, short and serrate, that is, slightly toothed; the legs reddish. There are six British species in the genus *Cryptohypnus*, and one of them by exceptional good luck we might find in the shingle of our stream; it is called *C. maritimus*, like *riparius*, but rather smaller and narrower and more of a dead black colour. The other four species are all very much smaller, 2 to 3 mm. long. They too occur in the shingle of streams, two of them in Scotland only, but we might easily find the other two in the finer gravel of such a brook as this. One is *C. dermestoides*, which is entirely black dull and slightly pubescent, and this has a varietal form known as var. *quadrigultatus*, which bears two small obscure yellow spots, one at the base and one at the apex of each elytra. The other is *C. quadripustulatus*, which is very similar to this spotted form of *dermestoides*, only the yellow spots are much larger and more conspicuous; this latter species can sometimes be taken by sweeping in damp grassy places in the south—the other with its variety is more distinctly

northern, and does not seem to stray from the gravel of its native brook side.

Among the heather there are plenty more large stones, and here we shall meet with beetles that are more distinctly of the moorland fauna than those we have been taking hitherto. *Calathus micropterus* (the small winged Calathus, the wings being really atrophied), Fig. 13, Plate V., may be the first. It will be remembered we have already met with a species of this genus on the downs—*C. flavipes* (Plate IV., Fig, 19), and referred to this *C. micropterus* as a moorland species; it is one which has never been taken in the south of England, but is not uncommon in Wales and Scotland. Superficially this beetle very much resembles *C. flavipes*; it is a little smaller—7 mm. instead of about 9, rather narrower in proportion and more shining, but the same pitch-black colour with yellow-red legs and antennæ, and on the third striа of the elytra there are three distinct punctures. We must be careful not to mistake for this species another form of *Calathus*, which is very common over the whole of England, called *C. melanocephalus*. In the usual lowland form the thorax is a clear red, but there is a mountain form or variety (the var. *nubigena*) in which the thorax is pitchy black and shining like the elytra; as the size is also slightly smaller than the lowland form it becomes exceedingly like *C. micropterus*. Two points will, however, always distinguish it—the thorax is quite straight sided behind and not slightly contracted as in *micropterus*, and the legs are darkened, almost black,

in fact, whereas they are always red in the other species. This phenomenon of a more or less light coloured lowland insect being replaced at high altitudes and in the far north and north-west of these Islands by a form very much darker in colour and often rather smaller, but in every other respect identical is one aspect of what is called Melanism, is not confined to beetles, as there are many examples of it among the *Lepidoptera* (moths and butterflies), and no adequate explanation of it has so far been discovered. In *Coleoptera* there are good examples in *Notiophilus aquaticus* and *Carabus arvensis*, both of which are shining copper-bronze in colour as they occur over the great extent of the country, but often quite black in the mountains of Wales and Cumberland and the moorlands of Scotland and Ireland. My own belief is that such melanic forms are not the immediate result of altitude or locality, but represent an older varietal race or form which has died out or been superseded by a later immigration in the south and east; indeed even in the localities where it exists at all melanism is not universal —under one of these stones for instance we may find *Notiophilus aquaticus* quite of the normal colour.

We have already taken *N. biguttatus* (see Plate II., Fig. 3) and know the great bulging eyes and glossy metallic elytra which characterize the genus. This *N. aquaticus* (haunter of wet places) Fig. 5, Plate V., is very like that species, the same colour and about the same size, but it has no light patch at the apex of the elytra, and the antennæ and legs are entirely bronze-

black. *Notiophilus palustris* (meaning much the same), which is another species we might also take up here, is a little smaller, the thorax is shorter, more rounded in front and contracted behind than in *aquaticus*, and the first two or three joints of the antennæ as well as the tibiæ are more reddish than in that species.

Our next beetle is one which one never finds except among the heather, but even so we might search for it in vain on the heaths of the south, although the other member of the genus, which is *Cymindis*, is equally attached to the chalk and can occasionally be taken on Box Hill, in Surrey. Our heather species is called *Cymindis vaporariorum* (a name whose allusiveness although given by Linnæus is difficult to explain), Fig. 14, Plate V. It belongs to the same section of the *Geodephaga* as the *Brachinus*, the *Blechrus* and the *Demetrias* taken on the downs (Plate IV., Figs. 18, 4 and 9), which were all characterized it will be remembered by the elytra not quite covering the hind body, so that the apex of the abdomen projects just beyond them. This is a medium sized beetle, 8 to 10 mm. long, oblong and very flat; the colour is very dark brown, almost black except the base of the elytra, which is dull rust colour; the thorax is longer than broad, and very much contracted behind, and the whole surface—head, thorax and elytra—is thickly and coarsely punctured; the legs and antennæ are rust red. Sometimes in the early spring this is quite a common beetle under stones among the heather, while

later on in the summer one may turn over nearly every stone on the moor without seeing one.

By this time we have left the track by the brook side and have struck across the lower slopes by a rough path that seems to lead up to the steeper elevations beyond ; by the side of this path there lie many scattered stones deep among the heather, and besides this *Cymindis* we are almost sure to find under some of them two species of *Bradycellus—B. cognatus* and *B. similis*. We have already taken one species of this genus, viz.: *B. harpalinus* (see Plate II. Fig. 5). *B. cognatus* (the allied Bradycellus), Fig. 2, Plate V., is the same size as *harpalinus*, about 4 mm. in length, but under the glass it will be seen that the hinder angles of the thorax, although obtuse, are quite distinct, and as already stated it is the variation of these hinder angles which in *Bradycellus* is one of the criteria of its species. Moreover the colour is different ; this *cognatus* is a much darker insect, the head is black and the disc of the thorax dark brown, leaving only the margins yellowish, and usually the greater part of the elytra is dark brown, leaving only the shoulders, the side margins and a streak down the centre yellow-brown, but the species varies a good deal in the strength and extent of this darker coloration. However, it is the only *Bradycellus* we are likely to find up here among the heather except the other species referred to, *B. similus* (the Bradycellus like the others) Fig. 3, Plate V., and that is distinctly smaller, being only 3 mm. long—that is, about the average size of a

Bembidium, but its palpi will at once show that it is not one of that genus. In shape it is precisely like the previous species and like it varies somewhat in colour, but whereas *B. cognatus* is always more or less patchy, part dark and part light, this little *similis* is either quite light or quite dark or quite intermediate in colour. In the darkest specimens there is a line or stripe down the centre of the elytra which is always lighter; in both species legs, antennæ and palpi are reddish-yellow, the thorax smooth with a median groove, and the elytra plainly striated, but not punctured except along the striæ. *B. similis* is widely distributed wherever heather grows, but *B. cognatus* is one of the true moorland species.

If we search carefully among the ling and heather, or shake it over paper, since we brought no sweep net, there are two new beetles which will probably be revealed. One belongs to the group *Phytophaga*, the other to the *Rhynchophora*; the name of the first is *Lochmæa suturalis* (the Lochmæa with the marked suture) Fig. 9, Plate V. Hitherto the only beetle we have taken near this genus was a *Luperus* (Plate I., Fig. 11); it is about 5 mm. long, oblong in shape, with long antennæ and rather soft leathery elytra, the thorax much broader than long, with a central groove and distinct depressions on each side. In colour it varies from light shining olive brown to almost black, and the suture or central line where the elytra join is always black, the whole surface except the front and middle of the thorax is coarsely punctured, the

legs, like the body, varying from light brown to black.

There are only two other British species in this genus of *Lochmæa*, one found on willows and one on hawthorn, especially when in flower, and both of them, although similar in shape and size to *suturalis*, are much lighter in colour.

Then there is the weevil or *Rhynchophoron*, which usually occurs with the *Lochmæa*. It is a *Strophosomus*, of which genus we have already taken one member, *S. coryli* (Plate I., Fig. 12); they are beetles with a short, broad rostrum, very projecting eyes, and a short convex, almost spherical hind body. This heather species, called *Strophosomus lateralis* (the bordered Strophosomus), Fig. 12, Plate V., is slightly smaller, and of a rather longer oval than is *coryli*. It is of a shining black with a border round the sides of the elytra of pinkish silvery scales; these light scales are also scattered over the sides of the thorax and the head. It is, however, only in comparatively fresh specimens that this light border can be really well seen, as in its journey through life these scales quickly get rubbed off, and then the whole beetle appears a shining black. The head and thorax are very deeply punctured, and the elytra strongly punctured in lines. We shall have no difficulty in recognizing this species, as there is none other occurs on the heather at all like it, with its short rostrum, protuberant eyes, and short convex hind body.

And so gradually ascending, the bare rock standing

out more and more through the heather in little shelves and ridges, we reach the summit, possibly the highest point for miles round. Behind and below us lie the involved slopes and undulations of the brown moors, and far beneath in the valley we can just see here and there among its trees the glimmer of the main river; on the other side the peaks of loftier mountains cut the distant sky-line, and as we approach the top we may notice traces of a broad depression surrounding the heaps of tumbled stones that form the actual summit. This was in fact once an entrenchment, and these scattered stones the remains of some fortified stronghold in the long-forgotten tribal feuds of Kelt or Cymry. Such ruins crown the summits of many of these Welsh Border Hills, their history, builders and purpose lost ages ago, but in the word *Cær*—and our hill is probably *Cær*—something or another, familiar in such Cymric names as Cærnarvon, or Cærgwyle, or in the Irish Cahir, we have the dim echo

> "Of old, unhappy, far off things,
> And battles long ago"

—but now the only sound that breaks the silence of the hills is the distant whistle of the golden plover or the wail of the curlew on the moorland somewhere beneath us.

Here, then, among these relics of forgotten days, we may enjoy our frugal lunch and comfortable pipe, and then begin again to poke about among the stones that surround us. No doubt we shall meet again

most of the beetles we have discovered as we came up; but also, if we have not yet seen it, we ought to find one of the larger Geodephagous beetles of the genus *Carabus*. One, it may be remembered, we found in a wood under a fallen log—that was a *C. violaceus* (Plate A, Fig. 3). This species is very much like it, not quite so large (20 to 24 mm. instead of 24 to 28), and not quite so long an oval in shape. It is called *Carabus catenulatus* (the Carabus of the little chains, the allusion being to a somewhat fanciful view of the elytral sculpture) Fig. 3, Plate B. It is of a dark indigo-blue colour, with the sides of the thorax and the shoulders and edges of the elytra violet, not shining coppery-purple, as in the not perhaps very accurately named *violaceus*; the elytra are covered with somewhat raised broken lines, interrupted by shallow punctures, which possibly suggest a chain-like pattern, so that the whole surface is very rough, the legs and antennæ quite black. It is a sluggish beetle, as are most of the *Carabi*, and will simply lie motionless when its covering stone is removed.

Then there is another weevil which we might notice walking across some bare spot or some under stone that rests quite lightly on the heather; that is, *Barynotus schönherri* (after Schönherr, a great Swedish entomologist) Fig. 17, Plate V. *Barynotus* is a genus of the *Rhynchophora*, which comes not very far from *Strophosomus*; it has the same broad short rostrum and convex oval body. The species, however, of which we have three, are all much larger than any *Strophosomus*, this

schönherri being quite 8 mm. long. It is easily known by its appearance—the elytra are black clothed with pinkish grey scales, but these are wanting along the suture and on two longitudinal lines or stripes on each elytra, which give it the look of a pink grey beetle striped with black; the head and rostrum are black and the thorax black with a few scattered greyish scales, all rather closely punctured. There are also lines of deep punctures in black on the elytra, and the legs and antennæ are quite black.

The two other members of the genus *Barynotus* are both large, heavy convex beetles, covered with grey scales without any interrupting lines as in *schönherri*, and are both more widely distributed and commoner than is that species.

One more capture we may add to the contents of our bottle before we retrace our footsteps down the hill. Like the last we might find it walking about or hidden in the heather under some stone not deeply imbedded in the ground. It is a rather large oval, almost cylindrical beetle, and as it lies quite motionless with head, antennæ and legs bent in close to the body it suggests nothing alive. This is *Byrrhus fasciatus* (the banded Byrrhus), Fig. 15, Plate V., and is supposed to own in common with the other members of its genus the popular name of "pill-ball beetles." Its size is 6 to 8 mm. long, its colour quite black, but clothed with a very thick and close pubescence which may be either a bronze-brown, grey, or dark brown-black; there is a variegated pattern of short darker lines, and slightly

below the middle of the elytra a waved band or fascia of lighter scales, light-grey, light brown, or yellow, sometimes quite evident, sometimes very obscure. The antennæ are short and black with a very gradual club, the legs either black, brown or reddish, also short with tibiæ broad and flattened; the head and thorax, which, like the elytra, are covered with a variegated pubescence, are closely and very finely punctured, as are the elytra. Were it not for the antennæ the beetle suggests the group *Lamellicornia* rather then *Clavicornia*, at the end of which is its real position, in a small genus of four species. One of these *B. pilula*, of about the same size, is not uncommon in sandy places, such as rabbit warrens, anywhere in the lowlands; the other two are smaller and much rarer. They are all covered with a thick down or pubescence of various shades of brown or grey, and variegated with lines and spots, but it is only in *B. fasciatus* that we see the peculiar waved transverse lighter band right across the elytra, although it must be admitted that this band is not always apparent, and we can take specimens right up to the tops of high mountains which, the scales being entirely rubbed off, are quite black. One characteristic of the genus is that there are grooves on the underside of the thorax and abdomen into which the legs fit when they are retracted, and this makes these beetles so smoothly cylindrical in life, and requires that we keep a *Byrrhus* when dead a long time in laurel before we attempt to set it.

A few more beetles we may pick up from beneath

stones on the way back, of the genus *Harpalus*, or *Bembidium*, or we might linger again by the brook side, for we have not yet discovered one half of the beetles which its shingle conceals; but although the way back is all downhill and much easier than was the ascent, we shall find we have not much time to spare for further investigation if we mean to catch our train and reach the point whence we started before the next morning.

PLATE VI.

BEETLES OF THE MOUNTAINS.

First Row. *From left to right.*

1 Elmis volkmari.
2 Elmis cupreus.
3 Lesteva pubescens.
4 Anthophagus alpinus.
5 Quedius auricomus.

Second Row.

6 Stenus guynemari.
7 Lesteva longelytrata.
8 Cyclonotum orbiculare.
9 Lesteva sharpi.
10 Geodromicus globulicollis.

Third Row.

11 Quedius umbrinus.
12 Diänous cærulescens.
13 Aphodius lapponum.
14 Acidota crenata.

Fourth Row.

15 Nebria gyllenhali.
16 Adimonia tanaceti.
17 Miscodera arctica.

Fifth Row.

18 Pterostichus vitreus.
19 Corymbites cupreus.
20 Pterostichus æthiops.

(All twice natural size).

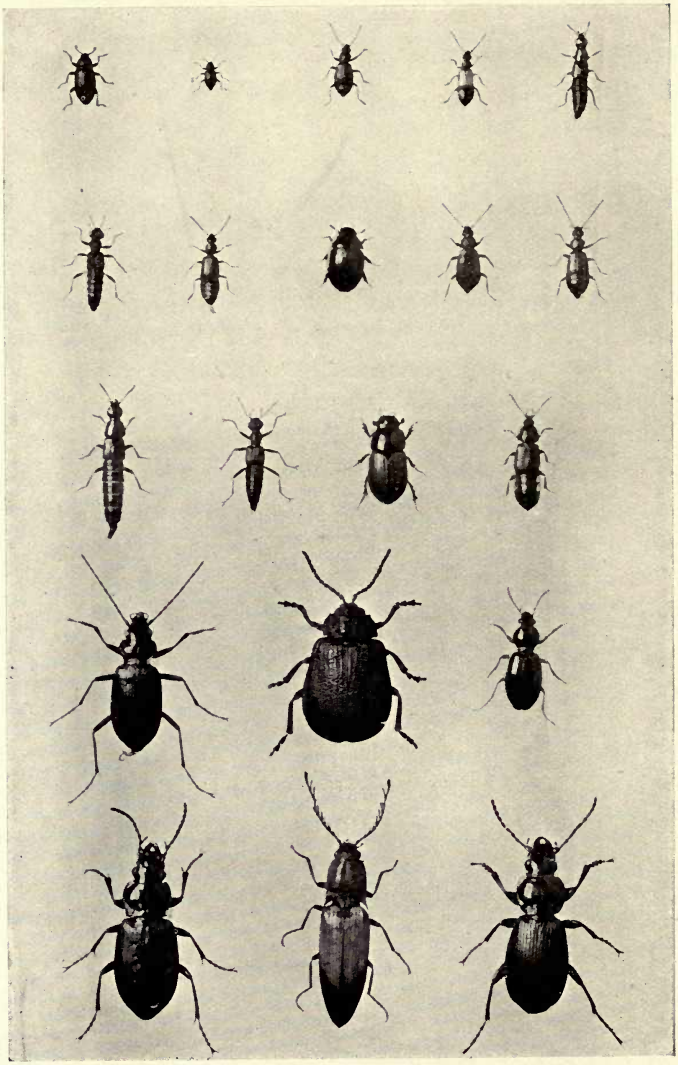

PLATE VI. [See over.

CHAPTER III.

The Beetles of the Mountains

In our survey of Upland beetles we have now explored the chalk downs of the south and the moorlands of the north-west; there yet remains a more difficult enterprise—the discovery of those specimens of *Coleoptera* who abide among the mountains. I have already explained how in my opinion such forms belong to an older race, and come of a lineage far more ancient here than the species we find inhabiting the greater portion of these Islands; the moorlands gave us many such species, the mountains will provide us with more. Not that lowland insects never occur on the highest mountains. I have before me a report of the Insecta collected at the meteorological station on the summit of Ben Nevis, picked up even off the surface of the snow, among which are many species whose home was very far from that eminence, whose presence there can only be explained by the action of wind, for most species of beetles that possess wings use them rather effectively at some particular period of their imaginal existence, rise high in the air, are carried vast distances by upper currents in the atmosphere, and finally deposited in situations quite unsuitable for the perpetuation of

their species. Hence we find a *Donacia* (a beetle of the marshlands) on the top of Ben Nevis, or other species equally irrelevant to their environment on other summits; but the true mountain species are found on mountains and nowhere else, and to secure them we must ascend these heights and extract them from their natural fastnesses.

But mountains—by which I mean eminences that approach or exceed at least 3,000 feet high—are neither so accessible as the chalk downs nor so abundant as the moorlands, and if we happen to live anywhere in the south of England we shall have to make a considerable journey to reach one. Pen-y-gent, or Crossfell, the Wrekin or Mœl Faumau, none of these or similar summits reach the necessary level; in fact, both in England and Wales one little corner in the extreme north-west of each will alone afford what we desire, in Ireland there are more, distributed all round the Island about the central plain, and in the Scottish Highlands of course our only difficulty about the mountains is to get at them.

Assuming, then, that we can find or make time for the two or three days or more (unless, of course we live somewhere near the mountains) necessary for the quest, we can take our choice of the particular peak we mean to explore—Cadr-Idris or the Carnydds; Helveylln or Skiddaw; Lugnaquilla or Croagh Patrick; Ben Lomond or one of the remoter heights of Invernesshire, and many others, the fauna of each may slightly differ, and there are perhaps one or two species

apparently peculiar to some special mountain, as *Chrysomela cerealis* is to Snowdon, but in the main the same Alpine forms are common to them all. As to the best time of year for such an expedition, late in May or early June will perhaps afford the most satisfactory results, although we can find beetles up in these altitudes all through the summer, and must be guided very much by the weather, choosing if we can, an occasion after a period of dry weather, since we want the mountain streams with a minimum of water in them, and the mountain bogs not impassable.

Up most of our well-known mountains, excepting perhaps certain remote peaks in the wilds of Rosshire the Western Islands, or the extreme south-west of Ireland, there exist more or less evident tracks worn by generations of adventurous tourists, leading from the base to the extreme summit. One indeed—and that perhaps the noblest of them all—has been hopelessly desecrated by the facilities accorded for reaching the top. For us, however—students of the fauna of the mountains rather than merely desirous of the attainment of the summit, or the enjoyment of a "view"—I rather recommend the avoidance of any such track. With a good map, a compass, and a modicum of common sense, one can (except in foggy weather, when the whole expedition is better abandoned) usually find one's way up by some more devious way, which, although it may ensure us more solitude, will probably reveal in broken mountain stream, secluded ravine, or remote boulder-strewn slope, more of what we have set forth to

discover, than the easier and more obvious pathway will ever afford.

Very often, as we did when we explored the moors, we cannot do better than follow the brook which, issuing from some glacier excavated tarn, llyn or loch high up under the final peak, winds its circuitous way from one level to another until it reaches the point whence our ascent begins. Of course, during the first part of the journey we shall traverse a region quite similar to that of the moorlands, and meet with the same species of beetles—species which we need not recapitulate; but there will be others, since the time of year is different, and of course as we rise beyond the 2,000 feet level a more strictly mountain fauna will begin to be apparent. Indeed, before we have got very far up the first grassy rock-strewn slopes we shall certainly notice a rather large beetle either sitting on a stone or crawling up a grass stalk; or else, if sunshine prevails, flying about with swift bee-like directness, and dropping suddenly among the herbage. If we can manage to catch a few of these beetles we shall see that they have the long narrow shape, the hard, shelly elytra, and the power of jumping if placed upon their backs which characterise the sub-group *Sternoxi*, (see Fig 19, Plate I.) But here there seem to be two species both the same size (12 to 14 mm.); one being a shining dark purple, sometimes with a greenish reflection, the other having only the head, thorax, a spot on the shoulders, and apex of elytra so coloured, the remainder of the elytra being yellow-brown with lines

of fine punctures in black. The latter form is *Corymbites cupreus* (the Coppery Corymbites) Fig. 19, Plate VI., and the entirely purple one is a variety of it called var. *æruginosus* (the bronze variety). Very often this variety is more common than the " type " form. Except in colour they are quite similar, a thorax much longer than broad, thickly punctured with a deep furrow down the centre, and the hinder angles very much produced, the elytra elongate, narrow and pointed at apex, and densely and finely punctured all over, antennæ rather long, pectinate (that is, with the joints produced into long teeth on the inside), legs retractile, (or folded back against the underside when we pick the specimen up), and black in colour. Individuals may often be taken in which the yellow colour of the elytra is darkened and the apical purple patch so extended that they seem intermediate between the normal form and its variety. The species is common on the mountain slopes in June, and we shall find it probably quite up to the 2,000 feet level.

But before we reach that point we shall be sure to find something interesting by the stream. The species of *Bembidiun* which we found haunting the shingle of a brook in a similar spot during the course of our moorland excursion are not yet passed away, and we can renew our acquaintance with them up here, but by turning over stones actually immersed in the water we shall probably find something fresh. Here and there on the wet lower surface of such a stone we may notice an insect that somehow more suggests a spider than a beetle, clinging

tightly to the stone; black in colour with long legs and short antennæ. This insect belongs to a genus named *Elmis*, and we may quite possibly find at least two species. They are both small, the larger, *Elmis volkmari* (named after the entomologist Volkmar) Fig. 1, Plate VI., about 3 mm. long, and the smaller, *E. cupreus* (the Coppery Elmis) only about half that size. Fig. 2, Plate VI. They are very similar in shape —a long oblong—with a thorax distinctly longer than broad, narrowed in front but not behind.

E. volkmari is black with a slight metallic reflection, and there are two deep and distinct incised lines down each side of the thorax, which is rather finely punctured; the elytra are punctured also finely, and the whole surface is slightly pubescent, it has long "sprawly" black legs and short reddish antennæ, with the apical joints slightly thickened, but not in the least clubbed, although this genus of *Elmis* belongs to the group *Clavicornia*, and comes near the end of it. The other smaller species, *E. cupreus*, is rather more metallic, and has red legs, the incised lines down the thorax are wanting, and there are slight impressions in their place, and the striæ of the elytra are somewhat raised in the form of ridges. We have six British species of Elmis, and they all seem to pass most of their lives clinging to the under surface of stones submerged in running water. *E. volkmari* is much the largest of them all, two of the others being about 2 mm. long and the other three only a little over 1 mm. Some of these species occur in brooks in the south of England, but

they are all much less rare in the clear becks and rivulets of the mountains.

Among these stones by the brook side we ought not to be long before we see one of our true Alpine beetles, that is, *Nebria gyllenhalii*, Fig. 15, Plate VI. (named after Gyllenhall, the great Swedish coleopterist). This is exceedingly like one of our commonest lowland beetles, one that we have already captured and named, *Nebria brevicollis* (see Plate II., Fig. 13). The differences between the two species, although quite constant, are very slight; if they are placed side by side it will be seen that *N. gyllenhalii* is rather smaller and quite distinctly of a more slender shape, and that whereas in *N. brevicollis* the antennæ and the tibiæ of all the legs are more or less reddish, in *N. gyllenhalii* these parts are normally quite black. We have already (see p. 36-37, Part I.), referred to the other species of *Nebria*, and pointed out how, out of the four which we possess, one is exceedingly abundant everywhere, and the other three all singularly restricted in their distribution.

But as we continue our ascent there are two species of that genus of large Geodephagous beetles of which we have already met with two or three representatives, viz., *Carabus*, which we shall probably encounter.

One, known as *Carabus glabratus* (the Smooth Carabus), Fig. 1, Plate B, is a large smooth, nearly dead-black insect, 22 to 24 mm. long, that is quite as large as either *C. violaceus* or *C. nemoralis*, but of a longer oval in shape and much smoother surface than any other British *Carabus*, the colour black, with just a hint of dark blue,

at the edges of the thorax, the legs and antennæ quite black. It is usually to be met with walking slowly across some grassy slope on the mountain, or by the side of the brook, a fine conspicuous beetle, quite a mountain species, and not particularly common there, so that we are not likely to find more than one or two in the course of our climb.

The other *Carabus*, also, but not so exclusively a mountain species, we may meet perhaps more commonly. We shall probably find it under some of the larger stones that lie scattered about right up to the summit, a smaller beetle, not more than about 18 mm. long, named *Carabus arvensis* (the Carabus of the plough lands—just the place where, in England at any rate, one does not find it), Fig. 4, Plate B. It varies much in colour, but is usually a coppery-brown, sometimes however greenish or brassy, and very often, especially in the west of Ireland, quite black. The legs and antennæ are quite black; it can be recognised without difficulty by its small size and the peculiar sculpture of the elytra, which consists of first a pattern of fine but interrupted parallel raised lines, and then a quadruple series of deeper linear impressions which together give the appearance of rows of granules, separated by very slightly raised ridges. *C. arvensis* is not an uncommon species, and with *C. catenulatus* and *C. glabratus* makes the only three members of the genus *Carabus* which we are likely to find at the altitude we have now reached.

But it would be well if we were now to concentrate

our attention on the stream whose course we have been more or less following for so long. We have perhaps reached one of those steep places where the vertical fall is almost as great as the distance traversed in a given space, where the turbulent water breaks down in a series of small cascades between the great boulders that encumber its course, or the walls of rock that hem it in, and all the course is lined and fringed with thick matted green moss, either submerged or continually wet with the spray and overflow of the stream ; it is this wet moss of the bed of the rivulet which harbours so many mountain beetles, to ensure whose capture it becomes necessary to adopt a special strategy.

Let us select some place where the stream has formed a fairly deep basin or pool not more than a foot or two across, and by the side of which is a securely dry bank of clean turf on which to kneel or lie. We stop up the outflow with stones, and moss, and then, tearing from the surface of the rocky bed of the stream handfulls of this thick moss which so copiously clothes it, we submerge it in our little basin, keeping it well under water with superimposed stones ; then prone on the dry turfy bank we watch the surface of the water. Very soon some small beetles will rise to the top out of the sunken moss, whence they can easily be removed to the laurel bottle, either by the finger placed beneath them, or more dexterously by a camel hair paint brush if we have remembered to bring such a thing, and indeed there are few more enjoyable methods of collecting beetles on a hot summer's day than this, lifted far above

the confusion, the strife, and the labour of the every-day world of men, high amid the solitude of the eternal hills, the only sound in our ears the musical rush and falling of water down its rock bound channel, stretched coatless on the short warm turf with arm submerged to the shoulder in the cool clear water to pick out the beetles, as one by one they come floating and struggling to the surface, or clinging like ship-wrecked mariners to some minute fragment of detached moss, most of them such as we should never meet with anywhere else. They will be all members of the sub-group *Brachelytra*. First there is a species which reminds one of a *Stenus* (Plate III., Fig. 11), but it is larger than any *Stenus* we have yet seen; in fact, it belongs to another genus and is named *Diänous cærulescens* (the blue Diänous) Fig. 12, Plate VI. It has the thin pointed body, the long legs, rather short antennæ, long palpi and very protuberent eyes of a *Stenus*, but its size is nearly 6 mm. long, and its colour a steel blue with a large orange-coloured spot on each elytra. As there is no British *Stenus* in the slightest degree blue in colour this is an insect easily recognized.

The next may probably be one of the real *Steni*, *Stenus guynemeri* (named after one of the old continental coleopterists), Fig. 6, Plate VI., not more than 5 mm. long, quite black and rather shining. It may be known from all the other members of the genus by the exceedingly coarsely punctured and irregular, almost crumpled-looking, surface of the thorax and elytra, and the legs, of which the first half of the femora (thighs)

and the tibiæ (second joint), are yellow, and all the rest black.

Then there are two species of *Quedius* whose home is this thick wet moss of the mountain streams; one, *Q. auricomus* (the golden-haired Quedius), Fig. 5, Plate VI., which we should get nowhere else. It is only 4 to 5 mm. long, which is much below the average size of a *Quedius*, in colour a shining bronze-black, and easily recognisable because on the hind body below the elytra, there are small patches of golden coloured hair (from whence the beetle takes its name), one on each side of each segment down to the apex; the legs and antennæ are reddish, and the eyes very large, although not protuberent after the manner of a *Stenus*, but the series of tufts of golden hair is the characteristic feature of the species, as no other British beetle is adorned in quite a similar manner.

The other *Quedius* is sometimes to be found in moss by the side of lowland rivers, but is always more abundant among the mountains. It is a little larger than *Q. auricomus*, about 6 mm. long, and known as *Quedius umbrinus* (the brown Quedius), Fig. 11, Plate VI. This species has no patches of golden pubescence—it is a shining brown-black all over, with the hind edges of the elytra, the legs and the antennæ reddish brown. It may be distinguished from other species of *Quedius*, some of which superficially resemble it rather closely, by the strong and coarse punctuations of the elytra, and as the others with which we might otherwise confuse it never occur in the wet moss of a mountain

stream we may be fairly sure that we have got the right species here.

The other small beetles which come struggling up to the surface belong to a genus of *Brachelytra*, of which we have so far met with no examples. This is the genus *Lesteva*, and in fact of the seven species known as British, we may easily take five in such a place as this, the two others, *L. fontinalis* and *L. luctuosa* having been found in Devonshire and the Isle of Eigg respectively. *Lesteva* is one of those genera, something like *Homalium* (see Plate III., Fig. 5) with comparatively long elytra, which come quite at the end of the *Brachelytra*. Of the five species which may occur in this wet moss the first, *L. longelytrata* (the Lesteva with the long elytra) Fig. 7, Plate VI., is fairly common in wet moss anywhere, and may easily be separated from the others by its distinctly longer elytra. Then there is *L. heeri* (named after Heer, the Swiss coleopterist), also not confined to the mountains; this species has much shorter elytra than the last, which are also much more deeply punctured than any other of our *Lestevæ*.

L. sharpi (named after Dr. Sharp, the *doyen* of British coleopterists), Fig. 9, Plate VI., rather larger and not quite so strongly punctured; *L. punctata* (the punctured Lesteva), very similar to the last but differing sufficiently in details of structure to be a good species; and *L. pubescens* (the hairy Lesteva), Fig. 3, Plate VI., which is the smallest of them all, and has the shortest elytra, very finely punctured, and covered closely with fine hair, complete the list of *Lestevæ* which we might

possibly pick out of this clear pool of mountain water, and two of them, *L. sharpi* and *L. punctata*, we might seek for in vain elsewhere. The colour of all these beetles is very similar—a reddish brown or reddish yellow, darker in *L. longelytrata*, which is often almost black, and varying very much in tone in the others.

A few beetles other than *Brachelytra* sometimes occur in this wet moss. Here, for instance, is a shining black globular insect which looks like a very large *Cercyon*, Plate II., Fig. 10). It is one of the same sub-group, the *Palpicornia*, distinguished by their very short clubbed antennæ and long palpi. This species is *Cyclonotum orbiculare*, Fig. 8., Plate VI. There is only this one British species in the genus, and it is quite common in wet moss by the side of upland rivers; it is about 4 to 5 mm. long, in shape a very convex oval, entirely shining black, closely and finely but very distinctly punctured all over; the short antennæ, of which the first two joints are red, terminate in a very distinct three-jointed club, the palpi black and the legs rather short with flattened tibiæ.

So far the majority of the mountain beetles we have met have been either carnivorous *Geodephaga* or semi-aquatic *Brachelytra*; in fact, of the large groups such as the *Rhynchophora*, or *Phytophaga*, there are very few specially mountain forms because there is so very little correspondingly specialized mountain flora, and of course no trees at all. There is, it is true, one species of *Chrysomela*, a genus of *Phytophaga*, *C. cerealis*, Fig. 6, Plate B., the only known locality for which in

the British Islands is a certain slope of Snowdon, where it feeds on the mountain thyme; another, Phytophagous beetle called *Adimonia tanaceti* (the Adimonia of the tansy, although in these mountain valleys it has not much to do with tansy) Fig. 16, Plate VI., occurs, but is not often visible. It is of a deep black, 8 to 10 mm. long, not very convex but deeply punctured all over, so that it looks rather dull with traces of smooth-raised lines down the elytra, the thorax small and much contracted in front, with an irregular surface, antennæ and legs rather longer and quite black. This beetle, as we have said, is not under ordinary circumstances very obvious, but if there should happen such heavy summer rain that the mountain brooks overflow and sweep over the valley slopes, then in the *débris* of such a flood this beetle is often found abundantly.

So much for our Alpine species of *Phytophaga*. There are also two species of the group *Lamellicornia*, which may fairly be described as mountain beetles, both members of genera we have previously met with. One is a *Geotrupes* (see Plate A, Fig. 8), those large blue-black shining beetles which are so fond of flying about on summer evenings; it is named *Geotrupes vernalis* (the Geotrupes of the spring), Fig. 8, Plate B, rather smaller than the common species of *Geotrupes*, being only about 12 mm. long, and is to be distinguished from *G. sylvaticus*, another *Geotrupes* of the same size by its smoother surface. There is one other small member of the genus which

is still smoother, in fact, quite polished, but this species (*G. pyrenæus*) does not occur on high mountains ; sandy heaths in the south of England being more promising places in which to search for it. This *G. vernalis* we may find crawling slowly and awkwardly over the short turf anywhere about the mountains.

Our other *Lamellicorn* is an *Aphodius* (see Plate II., Fig. 11), and we shall not find it beyond the point where the sheep can feed or climb, as it occurs in or about their droppings ; its name is *Aphodius lapponum* (the Lapland Aphodius) Fig. 13, Plate VI., 4 to 5 mm. long, of the usual cylindrical oblong *Aphodius* shape, shining black with the elytra usually more or less dark reddish brown, antennæ reddish with darker club, thorax finely and closely punctured with the front angles reddish, elytra with rather deep striæ, the space between the striæ very finely punctured, legs reddish brown. We shall not have much difficulty in recognizing this *Aphodius*, as there is only one other species that sometimes occurs at this altitude, and that is *A. ater*, which is smaller and shorter and blacker in colour, and has its thorax covered with punctures of two sizes, whereas in *A. lapponum* the thorax is finely but uniformly punctured.

But there are a few more mountain species of *Geodephaga* which at the height we are now attaining ought to be found under some of the looser stones. One of these is *Pterostichus vitreus* (the shining Pterostichus), Fig. 18, Plate VI. We have already met with more than one species of *Pterostichus* (see Plate II.,

Fig. 4). both larger and smaller than this. The size of *P. vitreus* is about 10 mm. long; entirely shining black with a thorax broader than long, rounded at the sides and contracted behind. But it is most easily recognised by the linear series of deep impressions or pits which run down each elytron; these vary in number from three to six, but are always very district, and the only other British *Pterostichus* which bears similar markings is *P. oblongo punctatus*, which is rather more brassy in colour and is never found near the summits of mountains.

Besides *P. vitreus* there is another *Pterostichus* which we may find as high up as there are stones scattered to turn over. This is very similar in colour and slightly larger in size, but there are no deep impressed punctures on the elytra, and the shape of the thorax is slightly different, being not quite so much contracted behind as it is in *P. vitreus*. This is called *Pterostichus œthiops* (the black Pterostichus); Fig. 20, Plate VI. The only species we could confuse with it might be *P. madidus* (see Plate A, Fig. 2). and that insect which does sometimes occur high up on the mountains, although much the same shape, is nearly 5 mm. longer, rather more shining black, and the legs, especially of the upland form, often red.

These are all the mountain *Pterostichi* we are likely to discover, but there is another characteristically Alpine beetle we ought to find under some stone up here. It is the sole representative we have in this country of its genus, *Miscodera*, and its

name is *Miscodera arctica* (the Northern Miscodera) Fig. 17, Plate VI. It is nearly always taken near the tops of mountains, although there are a few instances of its occurrence in more lowland localities, such as Cannock Chase, in Staffordshire, and one most singular spot, that is, at the base of the great heaps of slag from the blast furnaces which line the estuary of the Tees below Middlesbrough. There the beetle is found absolutely at the sea-level, but it seems a tenable hypothesis that it has been, in some stage and at some time, carried down, perhaps in flood refuse, from the high moors of Upper Teesdale and stranded on the flat shore of the estuary.

This beetle is very different from a *Pterostichus*; it is not more than 6 mm. long, of a glossy black with a strong brassy reflection, and its most salient feature is the very distinct neck or waist which separates thorax from elytra; the thorax is very convex with all the angles rounded, and the elytra are also convex and ovate with very faint striæ, which give it its peculiar glossy look; the legs and antennæ are dark red. In fact, *M. arctica* is a beetle which it is impossible to mistake, as we have only one species in the genus, and nothing else in our fauna at all like it.

And that may perhaps be the last species of mountain *Geodephaga* we may discover, unless indeed we find under some other loose stone fairly high up that second species of *Patrobus* called *Patrobus assimilis* (the similar Patrobus) to which allusion was made when we encountered *P. excavatus* in our walk across the

moors (see Plate V., Fig. 16). *P. assimilis*, as its name implies, is exceedingly like it—in fact, it may possibly prove that we should be more correct in considering it as a smaller and darker mountain race or variety of *P. excavatus* than specifically distinct from that insect. They differ in the following structural details only. *P. excavatus* has the head smooth, and the third interstice of elytra as broad as second; *P. assimilis*, on the contrary, has the head transversely wrinkled and the third interstice of elytra distinctly broader than second. The latter is also a much rarer form than the former, and confined to mountainous districts in the north, north-west, and west. The third and final British species of the genus *P. septentrionalis* we are not likely to meet unless our collecting takes place in Scotland.

By this time we ought to be nearing the summit and look back and down on the devious path of our ascent—the long rock strewn slopes up which we have toiled, the wet mossy hollows we have avoided, the spurs and ridges of solid outstanding rock we have overcome. Now it only remains to achieve the final peak, sometimes a mere wild heap of shattered stones; sometimes a narrow ridge, on one hand sheer precipice and on the other a gentle, grassy slope; sometimes a short but strenuous climb and then a flat wind-swept plateau. There at least we shall find space to sit down and rest and contemplate the desolate confusion of mountain tops all around, or the great straths that sweep down to the horizon far in the distance. But after a due interval

for rest and refreshment we must see what can be found in the thick, wet, luxuriant moss which fills up all the hollows and rock fissures on the northern; that is, the shady side of our peak, for it is in thick moss that some of our choicest mountain species abide.

The first difficulty will be to find a sufficiently flat shelf, sheltered by the main peak from the wind, where anchored by stones at the corners we can lay out our sheet of brown paper and shake masses of this moss over it. As we pull the bunch to pieces several small species of Brachelytra ought to drop out and run across the paper. Perhaps the first one we pick up may be something very like one of those *Lestevæ*, which the dripping moss out of the bed of the stream yielded us. One might easily mistake it for *L. sharpi* for instance—about the same size and colour, and with similar rather long antennæ and elytra. It however really is included in quite another genus, *Geodromicus*, and its name is *Geodromicus globulicollis* (the Geodromicus with the rounded thorax), Fig. 10, Plate VI. The difference which separates these two genera, *Lesteva* and *Geodromicus* is expressed by the relative lengths of the last joint of the maxillary palpi, which in *Lesteva* is four times as long as, but in *Geodromicus* hardly at all larger than, the last joint but one.

There are two British species of this genus, *G. globulicollis*, about 4 mm, entirely a mountain species, and *G. nigrita*, larger, about 4½ to 5 mm. and blacker, which although usually found in moss on mountains, also occurs in certain northern lowland localities as well.

Then we ought to notice a much smaller beetle, only about 3 mm. long, rather similar in shape and with the long wing cases of a *Lesteva* or a *Geodromicus* but narrower; this, like the last mentioned, is one of the two members of a separate genus called *Anthophagus*, and this species is named *Anthophagus alpinus* (the Alpine Anthophagus), Fig. 4, Plate VI. It is proportionately narrower than any *Lesteva*, and its elytra and legs are of a straw-yellow colour, the remainder of the insect being shining black. In the male the jaws are very strongly developed and there is a sharp projecting horn on each side of the head; these distinctions, the small, narrow shape and special colour render it impossible to mistake this beetle, if we have it on our paper. The other species of the same genus, *A. testaceus*, occurs only in Scotland and the extreme north of England.

Next there comes into view a distinctly larger beetle than any that we have seen from this moss so far; very parallel-sided and with shorter legs: it is *Acidota crenata* (the wrinkled Acidota), Fig. 14, Plate VI., again a member of atwo-species genus, comprising this, which is essentially an Alpine species, and another, *Acidota cruentata*, which often occurs in lowland localities in the south. *A. crenata* is an elongate parallel-sided beetle, about 6 mm. long, dark reddish-brown with the margins of the thorax, the apical edge of the elytra and edges of segments of the hind body lighter, the thorax, which is oval and rather narrowed in front, is thickly punctured, and there are regular lines of distinct punctured striæ on the elytra;

both antennæ and legs, which are dark red, are proportionately shorter than in the species we have just been examining. This species has been taken under bark of trees near Glasgow, but it is almost always to be found in moss on mountain tops.

A few more beetles might be got out of this moss if we devoted sufficient time to its disintegration; there is a little thing we might probably capture, a good deal like the *Acidota* we have just taken but only about half its size—it is called *Arpedium brachypterum* (the Arpedium with the short elytra), and is rather a prize, as we are not likely to take it anywhere except on the summits of high mountains. It is dark reddish-brown, finely but distinctly punctured all over, rather narrow, with short antennæ and legs. Then there are sure to be several species of those very small *Brachelytra* which belong to that large genus called *Homalota*, a representative of which we have already taken among the shingle of a moorland brook (see Plate V., Fig. 1). The species we are likely to find here are *Homalota tibialis*, *H. alpestris*, *H. islandica*, and perhaps *H. atramentaria*, but these are all difficult little species to make out, and at the best will require a good compound microscope and considerable study of the genus with the aid of a modern text-book before we can be even approximately sure of them.

During our descent we may pick up a few more of the same species of beetles that we discovered as we ascended —but probably nothing new unless by chance on one of the lower slopes we meet with a dead grouse, rabbit,

or even lamb. An ancient corpse, mere skin and bone, will serve our purpose better than a body newly dead, and if we carefully turn the remains over with a stick we are sure to notice several large beetles which, if not strictly mountain species, at least will be such as we have not previously seen. These are what are supposed to be popularly called " burying beetles," and they do in fact by burrowing beneath and around the dead bodies of birds or small mammals such as mice, when they rest on light sandy ground, and throwing the soil so excavated forward and upward by the spade-like action of their head, gradually cover up and in a sense bury such small corpses.

Anyhow we shall catch a glimpse of quite a number of large species as we turn the body over, some jet-black, some black and scarlet, some smaller and flatter with a wrinkled exterior, and some again smaller, almost globular and of a brilliant shining black; they will disappear into the moss and herbage or stones on which the carcase may rest with surprising celerity, and it must be our task to unearth them and secure at least a specimen of each for the laurel bottle. They all belong to the group *Clavicornia*, as the strongly clubbed antennæ of any that we succeed in capturing will make plain. The first will probably be a large plain black insect called *Necrophorus humator* (the burying Necrophorus), Fig. 10, Plate B. It varies somewhat in size, as do all these carrion beetles, but is usually at least 20 mm. long, and the only spot in it that is not jet-black is the club of the antennæ, and that is orange-red.

The antennæ are quite short, the head large and broad, and adapted to the function of a spade, the thorax rather broader than long, convex with all the angles rounded off, shining and finely punctured, the elytra also closely punctured with traces of raised lines and leave the apex of the abdomen uncovered, the legs well developed and powerful, as they have to assist in the digging process. In the males the tarsi, that is, the final leg joints, are very much enlarged and flattened out.

N. humator is probably our commonest large burying beetle and our only indigenous entirely black *Necrophorus*. The other members of the genus—and there are five of them—are all somewhat smaller, varying from about 12 to 18 mm., and their elytra are black marked by two very conspicuous transverse waved orange-red bands, otherwise they much resemble *N. humator* in structure, differing *inter se* in such points of detail as the colour of the antennal club, shape and and position of the orange bands, and shape of the second joint or tibia of the hinder pair of legs.

The species we are likely to take here on this mountain side is *Necrophorus mortuorum* (the Necrophorus of the dead), Fig. 7, Plate B. It is one of the smaller species, averaging not more than 12 mm. in length; the club of the antennæ is black, the orange bands of the elytra widely interrupted in the middle so as to look like two large orange spots on each elytron, and the tibiæ of the hind legs straight and not curved as in some of the other species.

Besides these *Necrophori*, which are the true "burying beetles," we are almost certain to disclose beneath this corpse a number of smaller flatter beetles also black and with a very rough exterior. These belong to the large genus *Silpha* which comes not far from *Necrophorus*. They, however, do not average more than about 12 mm. in length and differ much in shape, the thorax being almost semicircular, and the hind body proportionately much broader. We have thirteen British species and ten of these are quite black, differing, however, considerably in the sculpture of the elytra; of the remaining three, one is straw-coloured with five black spots on the hind body and is found on trees where it preys on the lepidopterous or other larvæ it finds there; one black and flat with a scarlet thorax found in fungi as well as carrion, but not common anywhere; and one convex shining chestnut-brown which occurs only in Ireland, the Isle of Man and some of the Scots Islands.

Nor are these *Necrophagi* and *Silphæ* the only beetles whose larvæ help to rid the earth of decomposing animal remains. There are several genera in the large family of the *Histeridæ*, many of whose species perform a similar office. They are all quite unlike the beetles we have just mentioned, and we shall hardly fail to notice them by reason of a dissimilarity so striking; those small highly convex or even globular polished black beads that lie so quiet with their short stiff legs bent in to their body and their antennæ concealed beneath the front of their head,—these are beetles of the genera *Hister* or *Saprinus*. The species of *Hister* are the larger,

averaging about 6 mm. in length, and there are two or three of them that are not uncommon in carrion ; the *Saprini* are smaller, 3 to 4 mm., and of these we may find four or five under similar conditions. All these beetles are a very short oval in shape, convex, black and shining. There are a few striæ, usually taking the form of incomplete engraved lines on the elytra, often enclosing curiously limited areas of punctuation ; their legs are short, strong and toothed, because like the same members in *Aphodius* (Fig. 13, Plate VI.), of which in that respect they remind us, they have been so modified to serve the function of digging implements, and to the same end the antennæ are shortened and retractile so that they should not interfere with the utility of the front of the head as a spade. This structure is common to all the species of both these genera and to some others of the *Histeridæ*, although the majority of their species are unassociated with carrion and more often to be found in decaying vegetable matter such as garden refuse or the damp bottoms of hayricks.

Thus we have about thirteen British species of *Hister* in all, and about eight of *Saprinus*, some of the former being marked with a large dull reddish spot on each elytron, and some of the latter having a greenish or purple metallic reflection. Another genus called *Gnathoncus*, which is very nearly related to *Saprinus*, is represented by two British species which are sometimes found in birds' nests ; other genera of the same family are associated with ants, and some occur in rotten wood. Many of these species are very rare and difficult to obtain, and

none of them is in any sense specially a mountain beetle. Wheresoever the carcase is, whether on seashore, or lowland pasture, or mountain side, there should we find these and some few other carrion beetles; but as a matter of ordinary experience the dead bodies of birds or beasts are more likely to remain unnoticed and unburied on some sequestered mountain slope than they are on the paths and meadows of the valley farms, and unless such corpses have lain undisturbed for some time we are not likely to find them tenanted by many beetles.

For when we dropped below the 2,000 feet level we left most of the genuine mountain beetle fauna behind us, and the remainder of our journey back to our base will differ but little from our expedition across the moors. We may therefore conclude by reminding such of our strenuous young students of British beetles to whom the opportunity of their ascent is given, that every mountain peak has to some extent its own insect fauna, that, especially in Ireland and Scotland, by far the larger number of these mountain peaks remain virtually unexplored, and that the existence of beetles new to our British list, perhaps even to science, waiting to be won in these virgin fastnesses, if not a probable contingency is at least quite within the limits of the possible.

NOTE ON THE SETTING AND MOUNTING OF BEETLES.

A FINAL word may perhaps be desirable as to the treatment of the specimens of beetles which we have brought home, in our laurel bottle or smaller tubes, from the various expeditions in which we have taken part; for even if the student has no ambition to form a "Collection of British Beetles," he will at least require named and mounted specimens for reference and comparison in the identification of new captures.

The subject, then, divides itself into two heads:—(*a*) the "setting," and (*b*) the "mounting," after they have been "set," of our specimens. It should, however, be understood initially, that the methods here described are merely those of the writer himself, that nearly every coleopterist has his own methods, and that there is no reason to suppose that one of these is any better than any other.

The processes of death have already been explained; the fatal bottle half full of crushed laurel leaves or buds into which captured specimens may be dropped and left for an indefinite time, except during hot weather, when a week or two will be found ample time to render

all, save perhaps some very stiff-legged *Rhynchophora*, or *Lamellicornia*, perfectly flaccid;—and the plan (more adapted for small, or special captures), of the small tube with the crumpled blotting paper inside, (to afford foot hold), and subsequent immersion of the contents in boiling water.

This latter method necessitates immediate setting on removal of the beetles from the vessel of hot water, whereas, if killed in laurel, the setting of the contents of the bottle may await one's convenience.

(*a*) A similar method of setting, however, applies in both cases, and the following is a list of the implements, neither numerous nor elaborate, which are requisite for the purpose.

(1) A piece of plain white paper, and a sheet of clean blotting paper.

(2) Four sable hair brushes such as watercolorists use, two flat, about $\frac{1}{8}$ and $\frac{1}{4}$ inch respectively, one small and finely pointed, and one fairly large.

(3) One fine needle, the end bent at an angle of about 45°, $\frac{1}{4}$ or $\frac{3}{8}$ inch from the point, (this bending can easily be effected by a candle, a pair of forceps, and a little cold water for re-tempering), the eye end inserted in an ordinary paint brush handle, and one pair of fine curved forceps such as microscopists use.

(4) A bottle of ordinary gum arabic dissolved in water (the ready-made " Office gum " sold in stationers' shops is not usually satisfactory), and a small

bottle of gum tragacanth, (which can be obtained in powder), dissolved in water to the consistency of a rather fluid jelly.

(5) Several pieces of clean white cardboard, such as the backs of visiting, or trade cards,—or a large sheet can be bought and cut up in pieces, the size of which does not greatly matter.

So equipped we may commence operations by turning the contents of our laurel bottle out on the sheet of white paper, carefully searching through the mass, picking out the dead beetles with the forceps and removing them to the sheet of blotting paper on which also we can lay any of the smaller specimens which we may have killed by immersion in hot water. The laurel itself, now clear of beetles, we can turn back into the bottle again for future use.

Next, we must turn on their backs the beetles, now on the blotting paper, which it is as well slightly to damp, and then with one of the flat sable brushes suitable to the size of the insect, carefully brush out its legs, antennæ, and palpi; the two hinder pair of legs directed backwards, the front pair and the antennæ forward at an angle, and the palpi straight forward. Then taking one of the cards sufficient in size to hold all the beetles of that particular bottle or tube, by means of the larger brush, gum the surface with arabic for the large to moderate sized specimens, or tragacanth for the very small or very fragile.

Then, transfer each beetle with the forceps or moistened brush as it lies on its back with legs, &c., extended

on to the gummed surface back uppermost (the exact position on the card will not matter, but it is as well as far as possible to arrange them in rows to facilitate the subsequent cutting up). The legs, antennæ, and palpi, must then be extended by the help of our finely pointed brush, and bent needle, more or less after the fashion in which they are depicted in the illustrations of this book. Finally a note should be pencilled somewhere on the card, of the locality and date of capture of those particular beetles, and the card put away in some box or shallow drawer, out of reach of dust, mice, or marauding insects, and left until it may be convenient, but not less than about a month, to dry.

N.B.—Very large beetles, such as the larger *Carabi*, *Geotrupes*, *Hydrophilus*, or *Lucanus*, may be pinned, by the passing of a fine pin through the right elytron, on to cork, instead of being set in gum, and the legs, antennæ, &c., held in place by other pins.

(*b*) Mounting.—For this, the final operation connected with our beetles, we shall require :—

(1) A wide-mouthed, glass-stoppered, bottle half full of benzine or petrol.

(2) A relaxing dish, which is simply a soup plate or large saucer, half filled with super-imposed circular discs of damp blotting paper, and covered by another plate.

(3) A pair of scissors.

(4) Several strips of white cardboard of a dull but smooth surface and moderate thickness, of

different widths, ½ inch for the narrowest, then ⅝, ¾, 1 inch, and so on, and all about three inches long. These can either be obtained from any stationers where they cut cards, or cut for oneself by one of those "guillotine" machines which amateur photographers use for cutting "mounts."

(5) A small bottle of strong gum arabic, or "fish glue."

(6) A box or two of entomological pins.

These things having been provided, we take one of the cards on which we first set the beetles indiscriminately, and which will now be sufficiently dry, cut it up so that there remains a number of small pieces of card each with its beetle affixed, and drop all these pieces into the bottle of benzine or petrol, adding one fragment, giving origin and date of capture of that particular lot. We leave these in the bottle for any time not less than a week—the effect of the fluid being to extract the greasy matter from the bodies of the insects, which would otherwise afterwards stain and discolour the cards on which they were mounted.

The next step, after a week or more soaking in the benzine or petrol, is to remove them on to the moist bed of blotting paper in our "relaxing dish." Here we leave them for about twenty-four hours, by which time the gum in which they are set, will have been so far softened and dissolved, as to render their removal with the forceps an easy matter, with the legs, antennæ,

&c., exserted stiffly in the proper position. It is best to lay them for a moment on a damp sheet of blotting paper, and remove with one of our flat brushes and clean water any superfluous gum which may have become attached to the legs, antennæ, &c., or has clogged the pubescence of the general surface of the body. Then taking one of our card slips, appropriate in width to the size of the beetle, we deposit on one end of it a small drop of the strong gum or fish glue, or in the case of a very small or fragile beetle a spot of tragacanth, and with the forceps, or, if the beetle be very small, a fine paint brush, we place our beetle exactly on the spot of gum which should be then just beneath the thorax. Finally, after leaving strip and mounted beetle for a minute or two to dry the gum, we cut off, by means of scissors or guillotine, that section of the card which bears the beetle, leaving sufficient margin of card all round the insect, and the specimen should be so placed that while the tips of the antennæ almost touch the upper edge of the card, some little space remains between its lower tarsi and the bottom edge.

Nothing then remains but to run a pin through the middle of the lower part of the card, draw the card with its mounted beetle half-way up the pin, and the specimen is ready to be put away in store box or cabinet.

One thing, however, is essential, each specimen must bear, either written on the back of the card which carries it, or written or printed on a small slip of paper which

the pin pierces and holds up close under the card, the locality and date of capture of the specimen* ; thus—

Sherwood Forest,
Notts
coll. W. Jones
(and date)

As to the final resting place of one's mounted specimens, after they have been named—the student is advised before the purchase and use of a " cabinet " to pin his beetles, over the specific but under the generic names, in a corked store box such as lepidopterists use. Lists of names, printed on one side the paper only, for labelling, can be obtained from any of the entomological shops,—the latest being that of Beare and Donisthorpe, published in 1904. In each of these store boxes a small piece of " carbol " to repel mites, and, if the place where the store boxes are kept be at all damp, a fragment of sponge saturated with strong carbolic acid (Calvert s, No. 5), for the prevention or eradication of mould, should be somehow fixed by pins, that they do not get loose and injure the other contents of the box.

After a number of these store boxes have been filled and our student becomes a " Coleopterist," a " cabinet " with a space provided and labelled for every known British species of beetle (and some over for possible additions) may be contemplated or indeed achieved.

* These slips of paper of the correct size, and printed for any desired locality, can be obtained very cheaply from Mr. J. H. Keys, Whimple Street, Plymouth, who makes a speciality of printing them for coleopterists.

LIST OF BOOKS RELATIVE TO THE STUDY OF BRITISH BEETLES PUBLISHED IN ENGLAND SINCE THE BEGINNING OF NINETEENTH CENTURY.

1802. Entomologica Britannica. Tomus I., by Thomas Marsham, F.L.S., London.
1806. Donovan's British Insects, by E. Donovan, London.
1823. Curtis's British Entomology. Vol. II. London.
1825. Monographie Pselaphidorum et Scydmœnidarum Britaniæ, by Denny, Norwich.
1829. Introduction to Entomology, by Kirby and Spence, London.
1836. Illustrations of British Entomology. Vol. VI. Coleoptera, by J. F. Stephens, F.L.S., London.
1836. The Entomologists' Text Book, by J. O. Westwood, F.L.S., London.
1839. Manual of British Beetles, by J. F. Stephens, F.L.S., London.
1854. Geodephaga Britannica, by J. F. Dawson, LL.B., London.
1858. Catalogue of British Coleoptera, by Waterhouse, F.E.S., London.
1866. British Beetles, by E. C. Rye, F.E.S., London.
1874. A Handbook of the Coleoptera of Great Britain and Ireland, by H. E. Cox, F.E.S., London.
1887. The Coleoptera of the British Islands, by the Rev. Canon Fowler, M.A., F.E.S., etc., London.
1914. Common British Beetles, by Rev. C. A. Hall, F.R.M.S., London.

Headley Brothers, Printers, Bishopsgate, E.C.; and Ashford, Kent.